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A RESEARCHER-MADE ACTIVITY MANUAL AND THE ACADEMIC PERFORMANCE OF GRADE 7 STUDENTS IN BIOLOGY

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ABSTRACT

The study entitled "A Researcher-made Activity Manual and the Academic Performance of Grade 7 Students in Biology" aimed to determine the effectiveness of the validated activity manual among the 60 Grade 7 students selected through purposive sampling. The study employed a Quasi-Experimental One-Group Pretest-Posttest design using validated 50-item multiple choice teacher-made pretest-posttest questionnaire. The pretest and posttest scores, before and after the Researcher-made Biology Activity Manual was employed, were compared likewise between the male and female students. Data were treated using paired t-test and independent t-test. Results revealed a statistically significant difference between the pretest and posttest scores of the students which indicates an improvement in the posttest after the students were exposed to the validated Researcher-made Biology Activity Manual. This implies that the researcher-made Biology Activity Manual is very effective in improving the scores of the Grade 7 students in Biology. On the other hand, no statistically significant difference exists in the pretest and posttest scores between the male and the female students. This indicates that both the male and the female students had comparable performance before and after using the researcher-made Biology Activity Manual, suggesting that the treatment was equally effective regardless of sex. The use of the researcher-made Biology Activity Manual is recommended in all Grade 7 Biology class.

Keywords: *researcher-made Biology Activity Manual, pretest, posttest, Grade 7 curriculum*

INTRODUCTION

The United Nations' Sustainable Development Goal 4 aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UN, 2015-2030). Therefore, educational institutions must deliver excellent education to their students and enhance their curriculum in the best interest of each learner. Apart from the

curriculum designing is the selection of good learning materials. Moreover, textbooks and other learning and teaching materials play an important role in both learning and teaching process. In the year 2025, the International Institute for Educational Planning under the mandate of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IEPP) expressed that these learning and teaching materials are critical in improving learning quality and student performance.

In support of this goal, the Department of Education unveiled the MATATAG Curriculum on August 10, 2023 through the DepEd Memorandum No. 54, s. 2023, as an initiative to elevate the quality of basic education in the Philippines. In 2024, the department then made a policy on its implementation which serves as the guide for educators and instructional leaders. The policy is an essential resource for educators when it comes to instructional planning, which includes subject matter selection, the use of instructional methodologies, the administration of assessment instruments, and the utilization of learning resources (DepEd Order No. 010, s. 2024).

Under the administration of the current DepEd Secretary, Sec. Sonny Angara, DepEd officially established the Guidelines for the Selection of Textbooks and Teacher's Manuals for Public School Use. The implementation of the selection process to guarantee the timely, effective, and efficient provision of the learning and teaching materials was described. This policy complies with the K–12 learning standards and requirements and is based on the ideas of good governance. Through the use of suitable and high-quality textbooks, learners will be able to acquire the values, attitudes, abilities, and information necessary for lifelong learning. The teaching materials will help teachers conduct instruction and learning in an efficient manner (DO No. 008, s. 2025).

Recalling the distressing impact of COVID-19 pandemic to the educational set-up of the Philippine education, printed learning materials such as modules, activity manuals including laboratory manuals were set into production. As for Madrigal and Talimodao's (2021) study on printed modular distance learning, they found that although modules aided in continuing education, problems including incomplete assignments, delayed distribution, and challenges in evaluating student learning were frequent.

In lieu with this challenge, the Department of Education issued a directive on its Basic Education Learning Continuity Plan in the Time of COVID-19 stating that self-learning modules must be made available in print and digital format for use in the upcoming school year, in addition to the textbooks that are given to the schools (DepEd LCP, 2020). From this point in time, digital and printed learning materials, specifically activity or laboratory manuals have been considered in all schools in the country; to continue the learning of every Filipino learner despite of the change from the typical classroom environment.

The Science curriculum for Grades 3 to 10 aims to cultivate scientific, environmental, and technological literacy among learners. Its ultimate goal is to equip students with the knowledge and skills necessary to engage actively and meaningfully in various local, national, and global settings. By mastering the curriculum, Filipino learners are expected to contribute positively to an ever-evolving, culturally diverse world and demonstrate competencies aligned with the objectives outlined in the Basic Education Development Plan (BEDP) 2030 (DepEd MATATAG Science Curriculum Grades 4 & 7).

Teaching Science demands not only a full-time discussion from the teacher, but rather an explorative teaching style. Inquiry-based learning helps students to actively

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engage themselves in the learning process, and helps them to build curiosity among themselves, able to solve problems, and develops their high order thinking skills. Similarly with the study conducted by Meng and Jumaat (2024), they were able to understand that even in an online learning environment, Inquiry-based learning has a significant impact on the behavioural engagement and performance of the students in Science classes.

Educational resources are essential tools in science education. They stimulate students' interest, help teachers design captivating lessons, and help make the connection between abstract concepts and actual occurrences. According to Recede et al. al (2022), educational resources are not always sufficient. Students would still struggle to learn if there were no helpful teaching resources available. Without effective teaching resources, concepts are impossible to understand.

Indeed, a good inquiry-based learning activity manual is a good aid for educators to stimulate the learners' optimum abilities and knowledge in learning science. This will help the learners not only to grasp concepts but also to explore and apply these concepts in their lives as a student and as an individual.

In line with this, the study sought to explore the effectiveness of a validated researcher-made Biology activity manual for the Grade 7 students and their academic performance in Virgen Del Pilar School Rodriguez, Inc. for the academic year 2025-2026.

Background of the Study

Quality learning and teaching materials, particularly in low-income countries, can compensate for disadvantages such as high-class numbers, inadequately educated instructors, insufficient instructional time, and low home literacy (UNESCO, 2025). As the Philippines, though may not be part of the low-income country, yet is part of the lower-middle-income country category (World Bank, 2025), is still in the borderline, and are experiencing the same situations just like those countries in the low-income category. This claim had reflected on the information showed by the Department of Education last July 2022 on its DataBitz, that a lot of public schools have big class sizes, which restricts individualized instruction and puts stress on instructors; and a related findings from the World Bank (2024), where in, it revealed the significant inequalities in how resources, such as infrastructure, instructional materials, and teacher deployment, are distributed throughout schools.

The Department of Education had implemented the Kto12 Curriculum a decade before the result of PISA 2022. In a study by Abragan e. al (2022), a comprehensive review of the implementation of the K-12 curriculum in the Philippines, focusing on the perspectives of teachers, parents, and students was provided. It identified challenges such as overloaded curricula, insufficient training, inadequate teaching resources, and financial burdens on families. The study also highlighted the government's efforts to address these issues through action plans aimed at improving curriculum delivery, enhancing teacher training, and upgrading educational facilities. Despite these challenges, the research underscores the potential of the K-12 program to enhance students' progress and future opportunities.

The Program for International Student Assessment (PISA) 2022 results reveal that Filipino students continue to face significant challenges in key educational domains. In mathematics, reading, and science, the Philippines scored 355, 347, and 356 points,

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respectively. These scores correspond to proficiency levels 1b in mathematics and reading, and 1a in science, indicating limited competency in these areas (PISA, 2022).

Moreover, in the newly introduced creative thinking assessment, Filipino students achieved a mean score of 14 points, placing the country among the lowest performers globally. This score is significantly below the Organization for Economic Co-operation and Development (OECD) average of 33 points. These findings underscore the urgent need for educational reforms and targeted interventions to enhance the quality of education in the Philippines (PISA 2022).

As the Department of Education issued the memorandum order number 008, series of 2025 on the guidelines for the selection of textbooks and teacher's manuals, it sparked a challenge to the educational community in both public and private institutions to be properly and selectively choose appropriate learning materials.

While the past studies focused more on developing instructional materials in different disciplines and in developing textbooks that were more into content discussions, there remains a gap in improving the learning skills and scientific skills of the learners through engaging and interactive resources, specifically through activities and experiments.

Based on the researcher's observations of the current situation in the research locale, there is a clear need for appropriate learning materials, particularly activity manuals, to address the scarcity of available instructional resources. Considering the shared thoughts by the high school Science teachers, most activities from the current laboratory manual were not performed due to the demand on the use of expensive chemicals and laboratory apparatuses. In addition, with this, Science teachers are modifying the provided activities on the laboratory manual by using alternative materials, and in some times, they are not using it at all. This has been a concern to the department since textbooks and laboratory manuals are intended to be used as they were bought and are not for free, the school values every resources whether for teachers or for students. With this, the researcher noted the need for more practical activities that do not require advanced technology or costly laboratory materials, as such requirements often hinder implementation and result in weakened or lost competencies. Considering the academic performance of the Grade 7 students during the First quarter of their Science class, 57.35% is Very Satisfactory, and 35.29 performed Outstandingly, but there were 5.88% who performed Satisfactory, and 1.47% under Fairly Satisfactory, which calls attention to improve the teaching-learning styles in the school. Furthermore, as the Department of Education frequently implements alternative modes of learning, the availability of learning materials that can be effectively used at home becomes an essential instructional supplement. In light of these considerations, this research was conceptualized to address the identified gaps, leading to the formulation of the statement of the problem.

Review of Related Literatures

This section offers an overview of the related literature carefully identified by the researcher through a detailed and methodical review process. It highlights significant studies, findings, and scholarly works that are directly relevant to the research topic, ensuring a thorough understanding of the existing knowledge base.

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Developed Learning Materials in Various Disciplines

Santos et. al., (2021) conducted a study on Least mastered competencies in Biology: Basis for instructional intervention, where findings showed that the Biology competencies for seven and eight graders were the least mastered by graders. Out of 122 student-respondents most of them are high in the aged of 16-17 and few aged of 18-above. Females are greater in number of respondents than males. The result shows that there are more female students in the distribution. In the analysis of ROSE (Relevance of Science Education) data indicates a difference in science-related affective variables based on gender. Boys' and girls' interests are different in context dependency and also in level of development, girls are more concerns than boys when it comes to environment, but boys are more aggressive than girls to become scientists and get a job. The respondents obtained "low mastery" in Grade 7 Biology competencies. There were also significant differences of students' least mastered competencies by school and sex and significant correlations among the least mastered competencies in Biology.

Similarly, De Guzman et.al., (2022) conducted a study on Students' Engagement and Meaningful Learning Experiences in using Digitized Concept Stories in Grade 7 Biology which aimed at exploring students' engagement, difficulties, and meaningful learning experiences in Biology class relative to the use of the developed intervention material, the digitized concept stories. It was found out that digitized concept stories served as a learning aid in Biology 7 because it makes the lesson easier to understand, help increase retention rate, provide additional knowledge, and clear explanation, and allows recognition of importance of the lessons delivered. It engaged the students by providing learning enjoyment and increasing their motivation and interest. It is appropriate in distance learning for Grade 7 students and can also be used for other topics in sciences and other disciplines. It was also found that the
developed materials are acceptable for teachers as they gave favorable evaluation on its qualities.

Likewise, Xu et.al., (2025) embarked on the development of a comprehensive Junior High School Biological Inquiry Experiment Manual. This manual was utilized in a research initiative involving 30 students in the control group and an equal number in the experimental group. The results showed that compared with the original textbooks of D Middle School, the developed Junior Middle School Biology Inquiry Laboratory Manual helps to improve students' interest, attitude and grade performance, so the newly developed Junior High School Biology Inquiry Experiment Manual is effective. It helps to cultivate students' core quality of Biology.

Moreover, Gregorio (2024) aimed to describe the experiences of the Science teachers teaching Biology in utilizing the Strategic Intervention Material (SIM) and to find out if there was a significant increase in the academic performance of the students using the SIM. The study found that SIM enhances students' interest as well as their retention of the lesson. Based on the data gathered, four (4) themes emerged: SIM as supplemental learning material, SIM as an intervention, SIM as quality assurance, and SIM as academic performance enhancement. The researcher used the pretest and post-test to determine the student's academic performance enhancement and analyzed the results using the paired-sample t-test. The results showed that there was a significant increase in the student's performance from the pretest to the posttest. The SIM was

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deemed beneficial in upgrading students' learning of the subject's content and increasing their academic performance.

Furthermore, Esther Etop et.al., (2023) examined the influence of locally available instructional materials on Biology students' academic achievement. Findings revealed that there is a significant influence of locally available instructional materials on Biology students' academic achievement. Also, there was no significant influence of gender on the use of locally available instructional materials on Biology students' academic achievement. It was recommended amongst other that biology teachers should be encouraged to source for and use locally available instructional materials for effective teaching and learning as it stimulates Biology students critical thinking/imaginative skills as well as help in reducing subject abstraction phobia, thus, improving biology students' academic achievement.

Additionally, Maravilla et.al., (2024) aimed to assess the efficacy of using the Contextualized Activity Tool in enhancing the scientific competencies of Grade 7 students. The study's findings indicate that the contextualized activity tool significantly improves the science competencies of grade 7 students. Moreover, the research yielded a notable disparity and an augmentation in the evaluation of science learning outcomes between the pre-test and post-test, indicating that it facilitated the students' enhanced understanding of the subject matter. The preliminary assessment indicated that most participants scored at the introductory level. Simultaneously, the post-test findings indicate that students achieved a competency level close to the expected standard after using the instrument. This illustrates that using contextualized activity tools yields a substantial disparity in their science learning outcome. This finding also indicates that integrating contextualization as a learning tool enables students to actively participate in discussions and comprehend the material and concepts in various ways. Consequently, this fosters an elevated cognitive capacity in pupils and enhances their academic achievement.

In the Division of Sorsogon, Philippines, math teachers created and used teaching resources that were extremely limited for classroom use, according to a study conducted by Mendiola et. al (2022). Additionally, it found that teachers had trouble using the teaching resources. The current study in light of these findings ensured that the validated researcher-made Biology activity manual is easy to use and appropriate, and it will take into account whether that it is user-friendly for both teachers and students.

In order to create outcomes-based instructional materials for three professional teacher education courses, Romarate et. al (2023) evaluated the various types of instructional materials that were used in the study: their frequency and availability, the difficulties that faculty and students encounter when using them, and the perceived necessity of creating new instruction. Based on appropriateness and suitability, the results indicated that the three professional courses used a variety of instructional resources. Similar difficulties were encountered by pre-service instructors and faculty members while using the created teaching resources using the Mann-Whitney U Test.

Nonato (2024) found a strong positive correlation between the academic performance of respondents and the post-test scores in a quasi-experimental study that sought to ascertain the impact of the redesigned learning materials in TLE on the academic performance of eighth-grade students.

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On the other discipline, a study conducted by Doria (2024) on the quality, usability, and potential effectiveness of self-learning modules for Social Science subject, revealed that there is no significant difference on the perception of the respondents to the Quality of SLM for the Secondary Social Studies Program in terms of content, format, presentation and organization and usability, contrary to the result of the pretest and posttest which showed significantly different data. In addition, the study showed no significant relationship and correlation between the quality and effectiveness of the self-learning modules (SLMs) in terms of content, format and presentation and organization. In a similar study on self-faced learning modules, it was revealed that learners struggled using the self-learning modules specifically on learning content confusion, mental exhaustion, restricted learning experience, and quickly getting distracted as part of their lived experience. Lumangyao, et. al (2024) stated in creating modules or self-learning modules it is important to consider the learners' level of comprehension and balance the content, and the teachers' availability.

In the descriptive study conducted by Tinonas, et. al (2023) on 376 second year high school students, learning modules were used for the modular learning modality of the school. In the study, modular instruction was effective in helping students to better understand lessons and had improved the students learning experiences, specifically in the areas of clarity, constructive alignment, and content.

In another study on the use of learning modules in enhancing the implementation of printed modular distance learning material in the Philippines, Tanucan et. al (2023) revealed the four presences to enhance the implementation of printed Modular Distance Learning (MDL). The study presented recommendations on how the Department of Education can improve the MDL program focusing on the four presences: structural; community; intervention; and quality assurance. It was recommended that for the better implementation of the learning modules, stakeholders such as teachers and parents must be trained and oriented properly. Finally, learning modules must be crafted to be engaging and aligned with the needed learning competencies to improve students' learning outcomes and performances.

A study on the effectiveness of instructional materials for the enhancement of professional education was conducted to examine the potential of printed learning resources in supporting the cognitive and affective development in the Philippine Higher Education system particularly of the second-year students. In this study of Alejandro (2025) revealed a statistically significant improvement in student performance after the introduction of the learning modules resulting to an average score of 32.80 to 35.25 showing a notable effect.

Laid, et. al. (2025) in their study on the exploration of hands-on learning, technology integration, and student-centered approaches, found that hands-on learning strategies, including activity manuals and guided worksheets, improve students' participation and motivation in science classes. The study's systematic review showed that student-centered learning approaches encourage collaboration, problem-solving, and critical thinking skills among learners. Noting that the skills mentioned are essential in science education where experimentation and observation are important components of learning.

The usefulness of activity guides in science instruction was further supported by research on worksheets and guided learning resources. Buniel, et. al. (2021) discovered

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that students' academic performance and comprehension of Science 9 were enhanced by the creation of scientific worksheets. According to the study's findings, structured activity materials aid students in organizing their thoughts, honing their scientific knowledge, and reinforcing what they have learnt in class.

In the study of evidence-based active-engagement science instruction by Karim, et. al. (2025), the results showed activity-based learning improved performance for both male and female students, according to another study on; however, gender gaps in science achievement persisted. This suggests that instructional materials, such as activity manuals, should be created to support a variety of learning needs.

Furthermore, by promoting equitable engagement in scientific inquiry and experimentation, activity-based interventions and guided learning materials help decrease the gender gap, according to research on gender stereotypes in science education. These organized resources support female students' growth in self-assurance and enthusiasm for science courses. (Liccardo, et. al., 2025)

The studies have shown that creating an appropriate learning material as a supplemental aid for teachers and students have high impact to the learning skills and academic performance of the students. Moreover, the current researcher realized that in crafting a learning material, the use of it must take into consideration to effectively and efficiently guide the teachers in using it and for better and easy use of the students.

Advantages in the Use of Activity Manual

In quasi-experimental study, Justina et. al. (2021), sought to determine the degree of life skills among adolescent girls and the efficacy of an activity-based intervention on life skills among adolescent girls, revealed a significant difference between the posttest results of the experimental and controlled groups, demonstrating that the activity-based intervention had significantly improved the respondents' life skills.

Correspondingly, Yang et al. (2022) conducted a study on the efficacy of an innovative educational module for medical students' professional competency in health literacy, in which respondents were Taiwanese medical students, they found that fifth-year medical students' professional competency in health literacy was considerably enhanced by the suggested creative instructional module, which is anticipated to help their future medical practices.

The results of the study conducted by Mansing (2022) on the effectiveness of the Learning Activity Sheets to the performance of the Grade 5 Pupils in TLE-ICT, revealed that using locally created or contextualized Learners Activity Sheets is highly beneficial for enhancing students' performance. This can be further explained by the fact that it can be a component of learning materials or strategies in addition to the various modalities outlined in the DepEd Memorandum.

Likewise, in research carried out by Dugan et al. al. (2023), in which Learning Activity Sheets (LAS) were employed to assist the traditional face-to-face Grade 9 Chemistry class. The students' performance on the posttest varied significantly, according to the data. Although students' performance has increased, statistically speaking, students in the experimental group that received the intervention performed improved. As a result, the LASs are successful in raising students' performance in Grade 9 Chemistry.

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Moreover, Lacea et al. (2023) did a comparable study on the utilization of learning activity in a math lesson, particularly the subjects of linear equations and inequality and rational expressions. With an interpreted mean evaluation of very high extent, the study's evaluators concluded that the created LAS was effective and beneficial in terms of objectives, concepts, skills, usability, appropriateness, and sufficiency. The study revealed that while there was a notable improvement in the students' learning, there was no evident difference in the standard response of the evaluators, which are made up of master instructors, Grade 8 math teachers, and teachers with LRMDS training.

Science Curriculum in Local and Foreign Setting

Bautista et al. (2024) evaluated the implementation of the Special Science Curriculum in public secondary schools across Rizal province. The study highlighted that schools demonstrated strong compliance with admission and retention procedures. However, it also revealed challenges in areas such as curriculum instruction, teacher development, and the availability of essential learning resources. To address these obstacles, the study proposed targeted interventions to improve the effectiveness of the curriculum's implementation.

Kastberg and Roebuck (2021) examined the challenges faced by science educators during the COVID-19 pandemic and the innovative strategies they used to adapt. The transition to online learning was particularly challenging for science education, which often relies on hands-on experiments and labs. To overcome these challenges, educators developed creative digital learning experiences, such as virtual labs, interactive simulations, and online resources, allowing students to engage with science remotely. They also incorporated local phenomena into activities, helping students connect scientific concepts to their daily lives. For instance, teachers used local environmental changes and community issues for investigations that students could conduct at home.

Furthermore, the study suggests that, while the pandemic posed significant challenges, it also reshaped science education, demonstrating that with the right tools, it can successfully adapt to remote and hybrid learning. Teachers are encouraged to continue using these lessons to blend traditional and digital teaching methods in the future. This study gave idea to the current study to create the activity manual in Biology to be more engaging and ensuring that the activities are connected to the Grade 7 students' daily lives.

Equivalently, The National Science Teaching Association (2021) highlighted the importance of equitable access to STEM education, emphasizing the need for marginalized and underserved students to engage in rigorous, high-quality learning experiences. It advocates for continuous professional development tailored to educators' needs, enabling them to improve their instructional strategies and adapt to evolving teaching practices. By incorporating the latest research, differentiated training, and technology integration, the statement underscores the need to equip teachers with the tools required to foster student engagement and deepen understanding.

In addition, the document also stresses the value of collaborative and sustained professional learning, recommending the establishment of networks among teachers, mentors, and peers to promote knowledge-sharing and collective growth. Furthermore, it emphasizes the transformative potential of systemic approaches to professional development, ensuring all educators—regardless of career stage—can effectively deliver

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inclusive and impactful science education that prepares students to tackle future challenges.

DepEd MATATAG Curriculum

A study conducted by Saro et al. (2024) highlighted that the teachers expected considerable advancements in students' critical thinking, problem-solving, and communication abilities. However, the research also pointed out challenges, including the need for professional development and sufficient resources, which hindered effective implementation. The findings emphasized the necessity of ongoing training and support for educators to ensure the successful execution of the curriculum.

Kilag et. al (2024) examined the characteristics of the MATATAG Curriculum, emphasizing its focus on critical thinking, digital literacy, and fostering global citizenship. The curriculum adopts an interdisciplinary framework, enabling students to integrate knowledge across various subjects and equipping them to address global challenges effectively. However, the study also identified challenges, such as insufficient resources and the need for comprehensive teacher training, as obstacles to its successful implementation.

In a separate study, Kilag et al. (2024) highlighted the alignment of the MATATAG Curriculum with the 21st-century skills framework, specifically the "7Cs"—Critical Thinking, Communication, Collaboration, Creativity, Citizenship, Character, and Confidence. Teachers noted that the curriculum effectively improved students' academic performance while also fostering their social-emotional growth. The study underscored the need for enhanced teacher training and the development of improved assessment tools to more accurately evaluate the integration of these essential skills.

In another study, Kilag et al. (2024) emphasized the potential of the MATATAG Curriculum to elevate educational standards by prioritizing foundational skills and values education. The research underscored the curriculum’s inclusive nature and its capacity to cultivate a strong sense of identity among Filipino learners. Nonetheless, it also highlighted challenges, including insufficient facilities in rural areas and the lack of interactive learning materials, which posed barriers to its successful implementation.

Furthermore, Diquito (2024) investigated the incorporation of technology and engineering literacy into science education within the MATATAG Curriculum. The findings revealed that students exposed to this curriculum showed improved comprehension of scientific concepts and a greater enthusiasm for pursuing STEM-related fields. The study emphasized the importance of enhancing technological support for science educators and providing them with additional training to ensure the effective utilization of digital tools in the learning process. These findings supported the journey of the current researcher in creating the biology activity manual, as variety of applications (technology) were used.

Moreover, teachers expressed strong support for the MATATAG Curriculum, recognizing its potential to enhance students' critical thinking and problem-solving abilities. However, Abulencia (2024) noted challenges such as insufficient resources and inadequate preparation among educators. To address these issues, the study proposed establishing a collaborative learning ecosystem where teachers could share best practices, access essential resources, and receive support to improve the curriculum's effectiveness.

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Likewise, the study entitled, "MATATAG Curriculum Rollout: Understanding Challenges for Effective Implementation" by Villaver et al. (2024) examines the difficulties encountered during the rollout of the MATATAG Curriculum in the Philippines. It identifies several significant challenges. First, teacher readiness and support systems are a concern, as educators face issues like gaps in pedagogical knowledge, inadequate training, and limited access to instructional materials, which hinder the effective implementation of the curriculum. Second, inclusive education and equity remain problematic due to resource shortages, infrastructural limitations, and insufficient policies that restrict equitable access to quality education for all students. Lastly, the absence of robust evaluation mechanisms affects the ability to assess the curriculum's effectiveness and address emerging issues promptly.

A similar study that also discusses the challenges of MATATAG Curriculum by Saro et. al (2024), investigates teachers' perspectives on the MATATAG Curriculum's effects on basic education in the Philippines. The research employed a qualitative methodology, utilizing Focus Group Discussions (FGD) with a purposive sample of 30 teachers from various schools in the Agusan del Sur division. The findings revealed that participants perceived the MATATAG Curriculum as having the potential to significantly enhance students' critical thinking and problem-solving skills. They anticipated that the curriculum's emphasis on real-world problem-solving and interactive learning would foster a more analytical and creative learning environment, aligning with contemporary educational trends that support student-centered pedagogies. However, participants also expressed concerns about the need for extensive professional development and adequate resources to support the successful implementation of these new approaches. They identified insufficient professional development and training as major obstacles, along with anticipated resistance to change and adaptation issues. They highlighted that effective implementation of the MATATAG Curriculum depended on sufficient resources and institutional support. Future studies were recommended to assess the long-term effectiveness of the MATATAG Curriculum on student outcomes, teacher satisfaction, and overall educational quality.

Factors Affecting Science Process Skills

Factors affecting the development of science process skills among Grade 7 students in remote learning settings were the focus of this study. Montenegro et al. (2024) identified key predictors, including the quality of science self-learning modules, the extent of parental support, and teacher engagement in guiding science learning. The findings revealed that students who benefited from higher parental involvement and access to well-designed learning materials exhibited stronger skills in scientific inquiry and experimentation. The study highlighted the need to improve remote learning tools and foster more active collaborations between teachers and parents to support the cultivation of essential science skills.

Dalumpines (2023) explored the impact of strategic intervention materials (SIMs) on enhancing the academic performance of Grade 7 science students. The findings demonstrated that students who utilized SIMs achieved notable improvements in their science knowledge and skills, as reflected in their stronger performance on subsequent assessments. The study emphasized the importance of SIMs in addressing specific learning gaps, making them an effective tool for improving student outcomes. Additionally,

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teachers appreciated these materials for enabling tailored and targeted instruction, which catered to the diverse levels of understanding within their classrooms.

Meanwhile, Manseguiao (2025) examined the development and evaluation of contextualized learning packets aimed at improving Grade 7 students' understanding of ecosystems. Both teachers and students responded positively to these materials, praising their relevance, accuracy, and quality. Students noted that the packets enhanced their grasp of ecological concepts by linking theoretical ideas to practical, real-world scenarios. The study concluded that using contextualized learning materials rooted in local environmental contexts significantly boosted students' science comprehension and engagement, underscoring the value of tailoring educational resources to students' surroundings.

Moreover, the study by Dimaano et al. (2020) investigated the role of online science engagement and learning interactions in fostering 21st-century skills among Grade 7 students. It found that while online platforms provided greater flexibility, students' engagement in science learning was crucial for building critical thinking and problem-solving skills. However, the research also highlighted that limited teacher-student interactions during remote learning hindered students' ability to fully engage with scientific content. To address this, the study recommended incorporating more active and synchronous learning activities to enhance interaction and promote skill development effectively.

Inquiry-Based Learning in the Field of Science

The study considered the principles and concepts of Inquiry-based learning in constructing the intervention of the study, the researcher-made Biology activity manual. According to Cannoy (2024), students engaged in inquiry-based learning activities exhibited significantly enhanced science process skills compared to their peers taught through traditional approaches. These improvements were particularly evident in areas such as observation, experimentation, data analysis, and forming conclusions. The findings emphasized the effectiveness of inquiry-based learning in fostering critical thinking and problem-solving abilities within science education. Additionally, the study suggested a detailed intervention strategy to better integrate inquiry-based methods into college-level science curricula.

By the same token, Jacalan et al. (2023) highlighted notable advancements in students' Physics academic performance following their engagement in inquiry-based learning. This method fostered active participation, questioning, and hands-on experimentation, resulting in enhanced comprehension and retention of challenging concepts. Moreover, students displayed improved conceptual understanding and demonstrated the ability to apply their knowledge effectively to real-world scenarios.

A phenomenological study examined how elementary teachers in New Corella District, Davao del Norte, Philippines, perceived the use of inquiry-based learning in their classrooms. Miasero (2024) noted that teachers credited this approach with fostering critical thinking, creativity, and curiosity in their students. However, challenges such as insufficient training, limited resources, and time constraints in addressing curriculum requirements were also highlighted. Despite these difficulties, the research emphasized the significant benefits of inquiry-based learning in actively engaging students and deepening their understanding through exploratory and inquiry-driven activities.

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A parallel study by Villanueva et al. (2023) investigated the impact of blended learning in Philippine schools through the Community of Inquiry (CoI) framework. The study highlighted that incorporating inquiry-based learning within blended learning environments significantly improved student engagement, interaction, and collaborative problem-solving. It was observed that combining online and in-person activities facilitated the establishment of a community of inquiry, which deepened students' understanding of the subject matter. Furthermore, the research emphasized the importance of social and cognitive presence in cultivating an effective learning environment, promoting teacher-student and student-student interactions that nurtured critical thinking and collaborative learning.

Likewise, Bioco et. al (2021) examined the practices, attitudes, and obstacles encountered by secondary science teachers in adopting inquiry-based teaching within Masinloc District. The research revealed that educators with greater academic qualifications and formal training in inquiry-based methods demonstrated more effective use of such strategies. Nevertheless, many teachers in the district faced challenges, including insufficient teaching materials, limited time, and the need for ongoing professional development. The study highlighted the necessity of providing continuous training opportunities and ensuring access to resources to enhance the successful implementation of inquiry-based learning methods.

Additionally, a study explored the effects of inquiry-based lessons on STEM students' competencies in limits and continuity within mathematics. Santos et al. (2020) observed a significant improvement in students' understanding of these complex concepts when this method was employed. The approach actively engaged students through hands-on and interactive exploration, fostering greater participation in the learning process. Furthermore, the study highlighted how the inquiry-based method developed critical thinking and problem-solving skills, enabling students to effectively connect abstract mathematical concepts to real-world applications.

Also, Tirol et al. (2021) investigated how the inquiry-based learning approach influenced Grade 6 students' performance and motivation in science subjects. The findings showed that students exposed to this method demonstrated substantial improvements in both their academic performance and their intrinsic motivation to learn. They participated more actively in classroom activities and exhibited a deeper comprehension of the scientific concepts being taught. The study concluded that inquiry-based learning encouraged students to take greater ownership of their learning experience, making the process more engaging, meaningful, and effective for them.

The studies mentioned above are related to the present study as they dwelt on instructional materials, such as activities, manuals, learning materials, video presentations, used by educators to facilitate teaching and enhance student learning by targeting specific educational objectives.

Theoretical Framework

This study is anchored on the precepts and principles of the Discovery Learning Theory by Jerome Bruner (1961) and Constructivist Learning Theory by Jean Piaget and Lev. Vygotsky.

Jerome Bruner introduced the Discovery Learning as a form of Inquiry-Based Instruction. This approach encourages learners to draw on prior knowledge and

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experiences, employing intuition, imagination, and creativity to explore new information and uncover facts, relationships, and truths. It emphasizes active engagement in the learning process, where learners seek answers and solutions rather than merely absorbing information. The key principles of this theory are: (a) Active Learning, (b) Problem-Solving Focus, (c) Prior Knowledge Connection, (d) Motivation and Engagement, and (e) Teacher as Facilitator

According to the theory, students learn best when they actively participate in the process rather than just passively absorbing information. It encourages investigation, inquiry, and problem-solving, enabling learners to find ideas and connections on their own.

The Discovery Learning Theory served as a guide for the study to craft a researcher-made Biology activity manual that supports discovery learning for the students. This theory gives support to the study of constructing an activity manual because the researcher-made activity manual's purpose is to lead students through practical, inquiry-based exercises. This encourages students to experiment, investigate, and find answers either alone or in groups rather than just providing facts. This promotes deeper learning, student engagement and knowledge retention.

To help students acquire knowledge educators employ Constructivism as an important learning theory from which the teaching learning process is anchored. Constructivism is based on the concept that students actively construct or create their own knowledge and that their learning experiences determine the nature of reality. Students use their prior knowledge as a foundation and build upon it as they acquire new information. The teacher acts as a facilitator that guide students in the learning process; therefore, constructivism supports student-centered learning process. In a constructivist classroom, learning is viewed as constructed, active, reflective, collaborative, inquiry-based, and evolving. The psychological theory of constructivism originates from the rapidly expanding field of cognitive science, primarily from the constructivist perspectives of Jean Piaget and the socio-historical work of Lev Vygotsky. (Chand, 2024).

The researcher-made Biology activity manual likely provides experiments, hands-on, inquiry-based activities that increases students' engagement. The activity manual is equipped with experiments on real-world applications, laboratory activities, digital tools integration, contextualization and localization activities, inquiry-based exercises, discovery and exploratory projects designed to guide students toward achieving specific, measurable learning outcomes, rather than just focusing on task completion. Students build understanding of biological concepts through active engagement, which explains improvement from pretest to posttest.

Research Questions

The study aims to use the researcher-made activity manual in Biology as a learning material in the classroom discussion of the Grade 7 students of Virgen Del Pilar School Rodriguez. Inc. during their Third Quarter. Additionally, the study would like to see the effect of the researcher-made activity manual in the academic performance of the students in their Biology class.

Specifically, this study sought to answer the following questions

1. What is the demographic profile of Grade 7 students with respect to sex?

Macaspac, M. K. G., & Veridiano, E. S. (2026). A RESEARCHER-MADE ACTIVITY MANUAL AND THE ACADEMIC PERFORMANCE OF GRADE 7 STUDENTS IN BIOLOGY. The Feurian, 1(1), 1059–1103. https://doi.org/10.17613/1v26d-qqb51

2. What are the pretest scores of the Grade 7 students in Biology before using the researcher-made activity manual?
3. What are the posttest scores of the Grade 7 students in Biology after using the researcher-made activity manual?
4. Is there a significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual?
5. Is there a significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual when grouped according to sex?
6. What program can be proposed based on the findings of the study?

Hypotheses

There is no significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual.

There is no significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual when grouped according to sex.

Scope and Delimitations of the Study

This study entitled, a researcher-made Activity Manual and the Academic Performance of Grade 7 Students in Biology, focuses on the effectivity of a researcher-made activity manual in Biology for Grade 7 students. The respondents of the study were limited only to the two sections of Grade 7 students at Virgen Del Pilar School Roriguez, Inc. The study used the researcher-made activity manual as an intervention for the Grade 7 students. The teacher-made questionnaire was used as a Pretest and Posttest assessment tool. It contains questions about the contents of the researcher-made activity manual which were anchored on the learning competencies of the Grade 7 Science curriculum, specifically in Biology. The study aims to identify the effectivity of the researcher-made Biology activity manual as a learning material that enhances the learning skills of the students. Through this study, the researcher was able to gain insights on how a well-made learning material could help students learn more in science, and help teachers in Virgen Del Pilar School Rodriguez, Inc. to innovate teaching strategies and learning resources.

The researcher-made activity manual is limited to Grade 7 students since it is based on learning competencies of the Grade 7 Science for the third quarter as mandated by the Department of Education (DepEd). Moreover, the content of the activity manual is only for the third quarter as specified by the DepEd curriculum and the results does not generalized the entire Grade 7 population as it only covers the Grade 7 population of Virgen Del Pilar School Rodriguez, Inc.

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METHODOLOGY

Research Design

The study is Quantitative in nature, specifically it employed the Quasi-Experimental One-Group Pretest-Posttest design as it includes procedures for data collection, analysis, and writing (Creswell & Poth, 2018). The researcher used a validated teacher-made questionnaire in the pretest and posttest. The questionnaire was constructed considering the contents of the researcher-made Biology activity manual that was used as an intervention in teaching Biology. This study explored the use of a validated researcher-made Biology activity manual that covers the third quarter lessons in Science 7 curriculum at Virgen Del Pilar School of the Academic Year 2025-2026.

The researcher used Quasi Experimental design to find out the reliability of the data that were gathered from the results and findings of the problems on the use of the validated researcher-made Biology activity manual for Science 7 curriculum. In Experimental research, the researcher needs to formulate a research question, propose a testable hypothesis, determine methods to manage variability throughout the experiment, select or create intervention conditions, draw a sample from the population and assign them to experimental groups, and establish the empirical measures to be collected along with the method for recording the data, this is according to Zubair (2022).

According to Allen (2017), a one-group pretest-posttest design has two characteristics. The first characteristic is the use of a single group of participants, which indicates that every participant is a part of a single condition and receives the same evaluations and treatments. The second characteristic is a linear ordering that involves measuring a dependent variable both prior to and following the implementation of an intervention. In pretest-posttest study designs, the difference between the evaluation of the pretest results and the evaluation of the posttest results are used to calculate the effect of a course of action. The researcher created test questionnaires for pretest and posttest to be validated, the questionnaires contained the lesson contents and learning competencies of the validated researcher-made Biology activity manual.

Locale of the Study

This study, focusing on the use of a validated researcher-made Biology activity manual in enhancing Science 7 curriculum, was carried out at Virgen Del Pilar School Rodriguez, Inc. This private nonsectarian, Catholic co-educational institution is managed by the congregation of the Sisters of Charity of St. Anne, teaching in the charism of the congregation: charity and humility. It is situated at Iloilo St., Montaña Phase 2 Subdivision, Burgos, Rodriguez, Rizal, in the Philippines. The school employs 40 teaching staff members—36 of whom are licensed teachers and 4 are non-LET passers—and 14 non-teaching staff, consisting of both lay and religious Catholic individuals. There are 34 High school teachers, and 12 teachers specifically teaching the Grade 7 students.

The school offers programs from Preschool to Senior High School with the ABM, HUMSS, STEM, GAS, and TVL-HE strands, currently accommodating 55 preschoolers, 259 elementary students, 270 junior high school students, and 117 senior high school students, counting to a total of 701 DepEd-registered learners. Adhering to an English-Only Policy, the school claims numerous facilities, including well-lighted and well-ventilated classrooms, libraries, laboratories for science and technology, a speech

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laboratory, a clinic, a dental clinic, a chapel, a canteen, playgrounds, conference rooms, a function hall, a covered court, an audio-visual room, an arts room, a soccer field, and several male and female restrooms. The school is accredited by the Private Education Assistance Committee. It is one of the only two Catholic schools in Rodriguez (Montalban), Rizal, and has been serving the community for 27 years.

Participants of the Study

The respondents for this study were the Grade 7 students of Virgen Del Pilar School Rodriguez, Inc. The researcher used a non-probability purposive sampling to identify the participants that were included in the research. This sampling technique relied on the researcher's judgment in choosing the participants. This grade level has been selected as the target group because it marks their first year under a new curriculum, the Revised MATATAG Curriculum, transitioning from the K to 12 Curriculum when they were in Grade 6. The Grade 7 level consists of two heterogeneous sections, with 34 students in each, summing up to 68 bona fide Pillarian students. Initially, all the 68 Grade 7 students were included and served as respondents in the study however, the parents of the 8 students did not allow their children to participate in the study. So, the respondents were trimmed down to 60 students. The same Science teacher throughout the first to fourth quarters of the academic year 025-2026 teaches these two sections. The researcher served as their laboratory teacher and was present during the entire third quarter during the implementation of the researcher-made Biology activity manual.

Instruments of the Study

The researcher-made Biology activity manual used in this study underwent validation by the selected school personnel of Virgen Del Pilar School Rodriguez, Inc. before it's utilization and the construction of the pretest and posttest questionnaires that were administered to the Grade 7 students. Before its utilization the researcher asked for the validation of the researcher-made Biology activity manual using the standardized evaluation checklist form issued by the Guidelines and Processes for Learning Resource Management and Development System (LRMDS) Assessment & Evaluation (Version: Final Draft 1.0, 2019) of the Philippine Department of Education. The researcher requested the following experts to validate and elicit comments and suggestions to improve the activity manual: (a) Assistant Principal, (b) Research Officer, (c) Science Department Head, (d) Head Guidance Councilor, and (e) Grade 7 Science Teacher. With this, the researcher-made Biology activity manual was undoubtedly evaluated by the school administration and other academic school personnel and was approved for use in the classroom discussion in Grade 7 Science class.

This research also utilized validated researcher-made pretest and posttest to measure the effectiveness of the Researcher-made Biology Activity Manual for Grade 7 Science class. Both pretest and posttest had the same content with a total of 50 items following the content standards of the topics in Biology 7. Topics include Microscope, Cell, Microorganisms, Types of Reproduction, Ecosystem, and Ecology. The pretest measured the students' prior knowledge while the posttest measured the students' acquired knowledge and understanding from the content standards and learning competencies after being exposed to the validated Researcher-made Biology Activity manual. The

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following scale with corresponding verbal interpretation below was employed to describe the performance of the students in the pretest and posttest:

Score Interval	Description
41-50	Outstanding
31-40	Very Satisfactory
21-30	Satisfactory
11-20	Fairly Satisfactory
0-10	Did not meet the expectations

The questions in the Pretest and Posttest are parallel and were constructed using a Multiple-Choice type with four given options in each item and has only one correct answer. A table of specification was also constructed to guide the scope of the questionnaire.

Table A

Table of Specification of the Test Questionnaire (Pretest-Posttest)

Content Standards	Learning Competencies	Number of Items	Test Placements
Familiarity and proper use of a compound microscope are essential to observe cells. The organelles of plant and animal cells can be identified using a compound microscope.	a) Identify the parts and functions and demonstrate proper handling and storing of a compound microscope. b) Use proper techniques in observing and identifying the parts of a cell with a microscope such as the cell membrane, nucleus, cytoplasm, mitochondria, and chloroplasts. c) Recognize that some organisms consist of a single cell (unicellular) like in bacteria and some consist of many cells (multicellular) like in a human; and d) Differentiate plant and animal cells based on their organelles.	10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Cells are the basic unit of life	a) Recognize that cells reproduce through two types	10	11, 12, 13, 14, 15, 16,

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and mitosis, and meiosis are the basic forms of cell division.	of cell division, mitosis and meiosis, and describe mitosis as cell division for growth and repair; and b) Explain that genetic information is passed on to offspring from both parents by the process of meiosis and fertilization		17, 18, 19, 20
Fertilization occurs when a male reproductive cell fuses with a female reproductive cell. Sexual reproduction is the basis of heredity.	a) differentiate sexual from asexual reproduction in terms of: a.1) number of parents involved, and a.2) similarities of offspring to parents.	10	21, 22, 23, 24, 25, 26, 27, 28, 29, 30
The level of biological organization provides a simple way of connecting the simplest part of the living world to the most complex.	a) Use a labelled diagram to describe the connections between the levels of biological organization to one another from cells to the biosphere.	10	31, 32, 33, 34, 35, 36, 37, 38, 39, 40
Identifying trophic levels helps understand the transfer of energy from one organism to another as shown in a food pyramid.	a) Describe the trophic levels of an organism as levels of energy in a food pyramid; and b) Use examples of food pyramids to describe the transfer of energy between organisms from one trophic level to another.	10	41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Data Gathering Procedure

1. Development of the researcher-made Biology activity manual

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The researcher started the study by identifying gaps in the school system. Then the researcher proposed for a suitable research title that addresses the gap. The research title was modified & revised upon consultation from experts. The researcher then constructed the researcher-made Biology activity manual based on the DepEd Curriculum Guide content standard and learning competencies for Biology 7. The constructed activity manual underwent validation by the chosen Virgen Del Pilar School Rodriguez, Inc. personnel namely: Assistant Principal, Science Subject Head, Research Officer, Head of the Guidance Office, and Grade 7 Subject Teacher. After validation the researcher-made activity manual was improved and modified based on the suggestions and recommendations of the expert validators.

2. Construction of researcher-made pretest and posttest

The 50-item multiple choice Pretest and Posttest were constructed following the content standards of the topics in Biology 7. The table of specification was prepared by the researcher to determine the learning competencies, distribution of items per chapter and placement of items. The questionnaire was validated by three competent and qualified professional Science educators in the District of Rodriguez, Division of Rizal, province of the Philippines.

3. Conduct of the study

The researcher sought the permission of the school principal of Virgen Del Pilar School Rodriguez, Inc. for the conduct of the study and collection of data. The researcher communicated with the current Science teacher of the Grade 7 students for the set-up of the study, and for the teacher's collaboration. The parents and guardians of the Grade 7 respondents were also sent a letter of consent from the researcher as a proof that the parents will allow their children to participate in the study, considering that the respondents are minors.

4. Administration of Pretest and Posttest

The Pretest was administered on the first teaching week of the third quarter of the academic year 2025-2026. The researcher-made questionnaire was given to the Science teacher to assess the prior knowledge of the Grade 7 students in Science 7 specifically the Biology curriculum. Results of the pretest were tabulated, analyzed and treated with appropriate statistical tools such as the mean, standard deviation, frequency and percentage distribution.

The Science teacher taught the lesson in Biology following the learning competencies of the MATATAG Science 7 Curriculum but with the use of the validated Researcher-made Biology Activity manual. Both sections of Grade 7 received the same teaching and learning strategies and assessments.

The Posttest was given at the end of the third quarter; the respondents had a quarter to learn their science lessons in Biology. After the third quarter examination, the Posttest questionnaire was given to the Science teacher to re-assess the knowledge gained by the Grade 7 students after they were taught using the Researcher-made Biology Activity manual. Results of the posttest were tabulated, analyzed and treated with appropriate statistical tools such as the mean, standard deviation, frequency and percentage distribution.

Statistical treatments were applied for further analysis of data. Results from further analysis would determine the effectiveness of the Researcher-made Biology Activity manual as intervention to make teaching and learning more effective, engaging, and

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personalized, and facilitating the achievement of learning goals and learning skills, in accordance with learning competencies of the Science 7 Revised MATATAG curriculum, of the Grade 7 students of Virgen Del Pilar School Rodriguez, Inc.

Statistical Treatment of Data

Using the Quasi-Experimental Pretest/Posttest design the researcher gathered the pertinent data needed for statistical treatment. The following statistical tools were used to answer the research questions.

1. For the first statement of the problem, “What is the demographic profile of Grade 7 students with respect to sex?” the **frequency distribution and percentage** were utilized.

   A **frequency distribution** represents how often each value of a variable occurs. It is commonly illustrated through frequency tables or graphs to show the data's spread and patterns (Turney, 2023).

   A **percentage** is a mathematical term that denotes a number as a fraction out of 100, symbolized by the percent sign (%). It is used to compare quantities, making it easier to understand proportions, ratios, and differences. Typically, a percentage is calculated by dividing a portion by the total and multiplying the outcome by 100. This concept is widely applied in areas such as mathematics, economics, statistics, and daily life to represent changes, rates, and comparisons (Oxford University Press, 2021).

2. For the second and third statements of the problem, “What are the pretest scores of the Grade 7 students in Biology before using the researcher-made activity manual?” and “What are the posttest scores of the Grade 7 students in Biology after using the researcher-made activity manual?”, the data were treated with the **frequency distribution, percentage, mean and standard deviation.**

   According to Bhandari (2023), the **mean** of a dataset is determined by adding up all the values and dividing the total by the number of values. It is regarded as the most frequently utilized measure of central tendency and is commonly known as the "average."

In a different study, Bhandari (2024) described **standard deviation** as a statistical tool that measures the degree of variation or spread in a set of data. It shows how much individual data points differ from the mean (average) value of the dataset. A smaller standard deviation suggests that the data points are closely clustered around the mean, whereas a larger standard deviation indicates that the data points are more widely dispersed. The following scale with corresponding verbal interpretation below was employed to describe the performance of the students in the pretest and posttest:

Score Interval	Description
41-50	Outstanding
31-40	Very Satisfactory

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21-30	Satisfactory
11-20	Fairly Satisfactory
0-10	Did not meet the expectations

3. For the fourth statement of the problem, “Is there a significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual?”, the data was subjected to **paired sample t-test.**

   Bhandari (2024) explained that a **paired t-test** is a statistical technique used to assess whether there is a significant difference between the means of two related groups. It is applied when the data includes matched pairs, such as measurements collected from the same subjects under two different conditions or at two distinct times. For instance, evaluating the impact of a training program by comparing employees' performance before and after the program uses paired measurements.
4. For the fifth statement of the problem, “Is there a significant difference between the pretest and posttest scores of the Grade 7 students in Biology before and after using the researcher-made activity manual when grouped according to sex?”, the data was subjected to **independent sample t-test.**

   An **independent samples t-test** often associated with educational resources is a parametric inferential statistical test used to determine if there is a statistically significant difference between the means of two unrelated (independent) groups Bhandari (2024).

Ethical Considerations

As this study was built on theories and practical development and discoveries, it equally builds its foundation on good ethics and morals. The researcher adhered to the following ethical considerations during the research process.

The researcher sought for the approval of the school principal for the conduct of the study. Respect and courtesy were highly considered upon the duration of the study; to the teachers whose valuable time might be affected, to the students who might feel uncomfortable during some processes of the data gathering, and to the Science teacher who taught and administered questionnaires to the Grade 7 students. Feedback from the teachers and respondents were highly valued and appreciated.

Prior to the conduct of the Pretest and Posttest, the researcher gathered informed consent from the participants, ensuring they were aware of their key rights as outlined in Republic Act 10173, also known as the Data Privacy Act of 2012. The document provided detailed information about the study, including its background, objectives, methodology, risks, and benefits, which participants were required to review and complete. The primary aim of the informed consent was to guarantee that participants clearly understood the purpose of the study and were assured that all the responses would be used solely for research purposes. Participants retained full discretion to withdraw from the study at any time, should they choose to do so, and were informed of potential implications arising from their participation.

Macaspac, M. K. G., & Veridiano, E. S. (2026). A RESEARCHER-MADE ACTIVITY MANUAL AND THE ACADEMIC PERFORMANCE OF GRADE 7 STUDENTS IN BIOLOGY. The Feurian, 1(1), 1059–1103. https://doi.org/10.17613/1v26d-qqb51

The confidentiality and anonymity of participants' personal information, such as names, are strictly upheld, with assurances that such data will only be used for research purposes. The information gathered will be securely stored for analysis and verification. Furthermore, the researcher provided a detailed explanation of how the data would be disseminated, including provisions for confidentiality when sharing data outside the institution. The researcher also clarified how the results would be utilized.

Ethical considerations were secured throughout the research process—before, during, and after the study. Respondents' participation was entirely voluntary, with no coercion or undue pressure. Respondents were given assurance that no harm, manipulation, or intimidation will happen while they are freely and conveniently providing the information required for a credible and valid study.

In accordance with the rules of academic writing, the researcher made sure that all sources of information, concepts, and data collected from any sources were appropriately credited and acknowledged. Additionally, the researcher adhered to anti-plagiarism guidelines by meticulously paraphrasing data and utilizing quotations sparingly. Every concept that was borrowed was appropriately recorded in the reference list using the recommended citation style. In order to guarantee uniqueness and uphold academic integrity, the researcher thoroughly examined the text using plagiarism detection software.

This study also adhered to ethical standards for the use of AI techniques. AI tools were only utilized to help with idea structure, grammar correction, and language improvement. The researcher made sure that content produced by AI was thoroughly examined, verified, and adjusted to fit the researcher's own comprehension and interpretation. The researcher's critical analysis and interpretation were not replaced by artificial intelligence (AI) techniques, nor were they utilized to falsify data or alter outcomes. It remained the researcher's obligation to make all final decisions, interpretations, and findings. This procedure made that the study remained real, credible, and compliant with ethical research guidelines.

RESULTS

The different tables for the results of findings of the study are presented**.**

Table 1
Demographic Profile of Grade 7 Students with Respect to Sex

Sex	Frequency	Percentage (%)
Male	35	58.3
Female	25	41.7
Total	**60**	**100.0**

Macaspac, M. K. G., & Veridiano, E. S. (2026). A RESEARCHER-MADE ACTIVITY MANUAL AND THE ACADEMIC PERFORMANCE OF GRADE 7 STUDENTS IN BIOLOGY. The Feurian, 1(1), 1059–1103. https://doi.org/10.17613/1v26d-qqb51

Table 2
Pretest Scores of the Grade 7 Students in Biology before Using the researcher-made Biology Activity Manual

Score Interval	Description	Frequency	Percentage
41-50	Outstanding		
31-40	Very Satisfactory		
21-30	Satisfactory	19	31.7
11-20	Fairly Satisfactory	31	51.7
0-10	Did not meet the expectations	10	16.7
Total		60	100
Mean		**17.55**	
SD		**6.09**	

Table 3
Posttest Scores of the Grade 7 Students in Biology after Using the Researcher-made Biology Activity Manual

Score Interval	Description	Frequency	Percentage
41-50	Outstanding	10	16.7
31-40	Very Satisfactory	31	51.7
21-30	Satisfactory	19	31.7
11-20	Fairly Satisfactory		
0-10	Did not meet the expectations		
Total		60	100
Mean		**34.35**	
SD		**5.87**	

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Table 4

Difference between the Pretest and Posttest Scores of the Students in Biology

Test	Mean	Increase/ Percent	Computed Paired t-test Value	p-value	Decision	Interpretation
Pre-test	17.55	16.8 (96%)	-59.778	0.001	Reject the Hypothesis	Significant
Posttest	34.35					

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Table 5

Difference between the Pretest and Posttest Scores of the Students when Grouped According to Demographic Profile Sex

Profile	Mean	Computed t-test Value	p-value	Decision	Interpretation
Pre-Test					
Male	16.31	-1.899	0.063	Do not Reject the Hypothesis	Not Significant
Female	19.28				
Posttest					
Male	34.37	0.033	0.974	Do not Reject the Hypothesis	Not Significant
Female	34.32				

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Table 6

Proposed Program

PILLARIAN EDUCATORS on C.R.A.F.T.T. Program (Construction of Relevant and Functional Teaching Tools)						
COMPONENT	**OBJECTIVES**	**ACTIVITY**	**PERSONS INVOLVED**	**RESOURCES**	**TIME FRAME**	**SUCCESS INDICATOR**
PRE-IMPLEMENTATION PHASE: Orientation and Construction						
Seminar on Inquiry-	Enhance teachers'	Conduct seminar	- Resource Speaker	- Laptop	1 day	The participating

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Based Learning and Learning Material Development	understanding of inquiry-based learning and strengthen their capability in developing effective student activity manuals.	for teachers regarding Inquiry-based Learning and the Guidelines in creating learning materials for students	- Principal - Assistant Principals - Faculty & Personnel Committee - Curriculum & Instruction Head - Subject Teachers	- Projector & Screen - Seminar Hand kits	(8 hours)	teachers demonstrate improved understanding of inquiry-based learning and has active participation during the seminar, and submit post-seminar evaluation results.
MATATAG Curriculum Review and Co mpetency Alignment	Ensure that the activity manual is aligned with the prescribed learning competencies and curriculum standards.	Reviewing the Curriculum Guide (DepEd) and the Curriculum Map of the school, and evaluate the learning competencies.	- Subject Coordinators - Subject Teachers	- DepEd MATATAG Curriculum Guide - Syllabus - Textbooks - Laptop	1-2 days	Learning competencies across grade levels of the MATATAG curriculum was aligned, as validated by subject coordinators and teachers through curriculum mapping and evaluation.
Training-Workshop on Inquiry-Based Activity Manual Development	Equip teachers with skills in designing inquiry-based activities and structured student learning materials.	Conduct Training-Workshop on the construction of an inquiry-based student activity manual.	- Resource Speaker - Principal - Assistant Principals - Faculty & Personnel Committee - Curriculum & Instruction Head	- Laptop - Projector & Screen - DepEd MATATAG Curriculum Guides - Textbooks - Seminar Hand kits	1 day (8 hours)	The participating teachers successfully design and produce inquiry-based activity manual outputs that demonstrate appropriate structure, alignment

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			- Subject Teachers			with learning competencies, and application of inquiry-based learning strategies, as evaluated through workshop outputs and feedback.
Development of Inquiry-Based Activity Manual	Develop a structured and competency-based activity manual for students.	Construction of the learning material (activity manual).	- Subject Teachers	- DepEd MATATAG Curriculum Guides - Textbooks - Laptop	14 days per quarter	A structured and competency-based inquiry-based activity manual is completed, with all of targeted lessons developed.
Activity Manual Validation and Evaluation	Ensure the quality, relevance, and appropriateness of the activity manual prior to implementation.	Validate the activity manual through expert review and teacher feedback.	- Subject Teachers - Subject Coordinators - Curriculum & Instruction Head - Assistant Principal - Principal	- Developed Activity Manual - Learning Material Assessment tool	1 day per 5 activity manuals	The activity manual is validated by subject coordinators, assistant principals, and principal with 95% of validators rating the material as relevant, appropriate, and aligned with learning competencies, and necessary revisions incorporated

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						prior to implementation.
Baseline Assessment	Determine students' initial level of performance before the implementation of the activity manual.	Administer pre-test to determine students' baseline performance.	- Targeted Students - Subject Teachers - Subject Coordinators	- Pretest Assessment tool - Pen	1 day (During the time of the subject teacher before the Quarter discussion starts)	Pre-test is administered to all the targeted students, and baseline data on students' performance is collected, analyzed, and documented to serve as basis for measuring learning gains after the implementation of the activity manual.
IMPLEMENTATION PHASE : The Usage of the Developed Activity Manual						
Teacher Orientation on Activity Manual Utilization	Familiarize teachers with the objectives, structure, and proper implementation of the activity manual in classroom instruction.	Teachers' orientation on the use and objectives of the constructed activity manual.	- Subject Teachers - Subject Coordinators	- Developed Activity Manual	1 day (1-2 hours)	All the target teachers participate in the orientation and demonstrate understanding of the objectives, structure, and proper utilization of the activity manual, as reflected in attendance records, participation,

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						and post-orientation feedback.
Classroom Implementation of Activity Manual	Integrate the activity manual into daily instruction to enhance students' learning engagement and academic performance.	Utilization of the activity manual in the classroom	- Subject Teachers - Students	- Developed Activity Manual - Other teaching materials	1 Full Quarter	The activity manual is utilized in all of targeted classes, with increased student participation, task completion, and engagement observed and documented through classroom monitoring and teacher reports.
Student Progress Monitoring	Track students' participation, task completion, and engagement during the implementation of the activity manual.	Monitor students' participation, completion of tasks, and classroom engagement.	- Subject Teachers - Students	- Developed Activity Manual - Assessment tools - Other teaching materials	1 Full Quarter	Students' participation, task completion, and classroom engagement are monitored regularly, with at least 85% of students actively participating and completing assigned activities, as reflected in monitoring tools, checklists, and teacher observations.

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Quarterly Monitoring and Feedback Sessions	Evaluate the implementation process and provide recommendations for improving the use of the activity manual.	Conduct quarterly departmental follow-up and feedback sessions.	- Subject Teachers - Subject Coordinators	- Developed Activity Manual - Assessment tools - Other teaching materials	1 day (End of Quarter Session)	Quarterly monitoring and feedback sessions are conducted as scheduled, with at least one session per quarter documented, and actionable recommendations are identified and implemented to improve the effectiveness of the activity manual.
POST-IMPLEMENTATION PHASE: Progress and Feedback						
Post-Implementation Assessment	Measure students' learning gains after the utilization of the activity manual.	Administer posttest to measure learning gains of the students.	- Targeted Students - Subject Teachers - Subject Coordinators	- Posttest Assessment tool - Pen	1 day (During the time of the subject teacher after the Quarter discussion ends)	Post-test is administered by the subject teachers to all of target students, and results show measurable improvement in students' performance compared to baseline data, indicating learning gains after the implementation of the activity manual.

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Feedback Collection	Collect perceptions and experiences of students and teachers regarding the effectiveness of the activity manual.	Gather feedback from students and teachers through surveys or interviews.	- Targeted Students - Subject Teachers - Subject Coordinators	- Interview or Survey forms	1 day (after the Quarter discussion ends)	Feedback is collected from at least 95% of participating students and all teachers, with responses analyzed to identify strengths, challenges, and suggestions, providing actionable insights for improving the activity manual.
Data Analysis of Learning Outcomes	Determine the effectiveness of the activity manual by comparing students' pre-test and post-test performance.	Analyze pre-test and post-test results.	- Subject Teachers - Subject Coordinators	- Pretest and Posttest results - Statistical analysis	1 day (after the Quarter discussion ends)	Pre-test and post-test results are analyzed for all participating students, showing measurable improvement in learning outcomes, with statistical or descriptive evidence indicating the effectiveness of the activity manual.
Program Evaluation and Recommendation	Provide evidence-based recommendations for	Prepare evaluation report and recomme	- Principal - Assistant Principals - Faculty & Personnel	- Statistical analysis and data - SWOT Analysis	1 day (end of the school year)	A comprehensive evaluation report is prepared,

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Development	improving and sustaining the use of the activity manual.	ndations for future use.	Committee - Curriculum & Instruction Head - Subject Teachers			summarizing findings from assessments, feedback, and monitoring, with clear, evidence-based recommendations for improving and sustaining the use of the activity manual, and the report is reviewed and approved by the school administration.

DISCUSSION

This section contains information about the results of the study and the analysis and interpretation of data gathered with the use of the adapted statistical measures. The presentation includes a narrative discussion of the results and implications of the data gathered. Moreover, it also presents the summary of findings, conclusions, and recommendations based on the results of the study.

Research Question 1. Demographic profile of Grade 7 students with respect to sex.

Table 1 presents the frequency distribution and percentage of the Grade 7 students in terms of their sex. Data shows that 35 or 58.3% of the students are male while 25 or 41.7% out of a total 60 students are female. This shows that the male students outnumbered the female students.

In the study of Leviste, et.al., (2025) the male respondents outnumbered the female students which is similar to the present study but contrary to the study of Laroza et. al., (2024) where the female Grade 7 students outnumbered the male students. Similarly, in the study of Santos, J. T. D., et.al (2021), females (66 or 54.10%) are high in number of respondents than males (56 or 45.90%). The result shows that there are more female students in the distribution. Studies mentioned that the analysis of ROSE (Relevance of Science Education) data indicates a difference in science-related affective variables based on gender. Male's and female's interests are different in context dependency and also in level of development. Females are more concerned than male

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when it comes to their environment, but male is more aggressive than female to become scientists and get a job.

Research Question 2. Pretest scores of the Grade 7 students in Biology.

As shown in Table 2 out of the total 60 Grade 7 students 31 or 51.7% obtained scores in the range of 11-20 which is equivalent to Fairly satisfactory performance before they were taught using the researcher-made Biology Activity Manual while 19 or 31.7% got score in the score range of 21-30 interpreted as Satisfactory performance. Ten (10) students or 16.7% attained scores in the lowest score range of 0-10 where students are categorized as Not meeting the expectations. The mean score of the students in the pre-test is 17.55 described as Fairly satisfactory with a standard deviation of 6.09 indicating somewhat a moderate distribution of scores in the pretest. The result indicates low mastery in the Grade 7 Biology. This result is similar to the result of the study conducted by Santos, J. T. D., et.al (2021) where the respondents obtained "low mastery" in Grade 7 biology competencies with an overall mean of 2.44 (SD=0.49).

Research Question 3. Posttest scores of the Grade 7 students in Biology.

As reflected in Table 3, 10 or 16.7% of students obtained scores in the highest range of 41-50 described as Outstanding performance, after the researcher-made Biology Activity Manual was employed, 31 or 51.7% had scores in the range of 31-40 categorized as Very satisfactory while 19 or 31.7% got scores in the range of 21-30 with Satisfactory performance. The mean of 34.35 in a 50-item test indicates that 68.7% scored well in the test which suggests a Very satisfactory performance in the posttest in Biology, however this also means that only about two-thirds of the students got the test correctly. But comparing it to the pretest, then there is a strong improvement in the students' performance. The standard deviation of 5.87 indicates that the scores of the students in the posttest are moderately spread which means that there's a mix of high and low performers.

The study is anchored on Constructivism by Jean Piaget and Lev Vygotsky which states that students actively construct or create their own knowledge and that their learning experiences determine the nature of reality Chand (2024). Students use their prior knowledge as a foundation and build upon it as they acquire new information. The teacher acts as a facilitator that guides students in the learning process; therefore, constructivism supports student-centered learning process. The researcher-made Biology Activity Manual provides activities and lessons that led the students to create and construct their own knowledge and interpretation of the new learned concept. In a constructivist classroom, learning is viewed as constructed, active, reflective, collaborative, inquiry-based, and evolving.

Discovery Learning Theory by Bruner, (1961) also provided the study with statement that supports its findings and results. According to the theory, students learn best when they actively participate in the process rather than just passively absorbing information. It encourages investigation, inquiry, and problem-solving, enabling learners to find ideas and connections on their own. The Discovery Learning Theory served as a guide for the study to craft a researcher-made Biology activity manual that supports discovery learning for the students. This theory gives support to the study of constructing an activity manual because the researcher-made activity manual's purpose is to lead

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students through practical, inquiry-based exercises. This encourages students to experiment, investigate, and find answers either alone or in groups rather than just providing facts. This promotes deeper learning, student engagement and knowledge retention.

This is also supported by the study of Dalumpines (2023) where she explored the impact of strategic intervention materials (SIMs) on enhancing the academic performance of Grade 7 science students. The result shows that students who utilized SIMs achieved notable improvements in their science knowledge and skills, as reflected in their stronger performance on subsequent assessments. The study emphasized the importance of SIMs in addressing specific learning gaps, making them an effective tool for improving student outcomes. Additionally, teachers appreciated these materials for enabling tailored and targeted instruction, which catered to the diverse levels of understanding within their classrooms.

Similarly, Manseguiao (2025) examined the development and evaluation of contextualized learning packets aimed at improving Grade 7 students' understanding of ecosystems. Both teachers and students responded positively to these materials, praising their relevance, accuracy, and quality. Students noted that the packets enhanced their grasp of ecological concepts by linking theoretical ideas to practical, real-world scenarios. The study concluded that using contextualized learning materials rooted in local environmental contexts significantly boosted students' science comprehension and engagement, underscoring the value of tailoring educational resources to students' surroundings.

Additionally, the study by Dimaano et al. (2020) investigated the role of online science engagement and learning interactions in fostering 21st-century skills among Grade 7 students. It found that while online platforms provided greater flexibility, students' engagement in science learning was crucial for building critical thinking and problem-solving skills. However, the research also highlighted that limited teacher-student interactions during remote learning hindered students' ability to fully engage with scientific content.

Moreover, the study of De Guzman, F., et.al (2022) aimed at exploring students' engagement, difficulties, and meaningful learning experiences in Biology class relative to the use of the intervention material developed—the digitized concept stories. Students' engagement towards learning Biology and difficulties experienced in class were revealed through in-depth interviews. After the utilization of the intervention material, the same respondents were again interviewed to encapsulate their meaningful learning experiences while using the intervention. It was found out that digitized concept stories serve as a learning aid in Biology 7 because it makes the lesson easier to understand, help increase retention rate, provide additional knowledge, and clear explanation, and allows recognition of importance of the lessons delivered. It engaged the students by providing learning enjoyment and increasing their motivation and interest.

The study of Xu, et.al (2025), embarked on the development of a comprehensive Junior High School Biological Inquiry Experiment Manual. This manual was utilized in a research initiative involving 30 students in the control group and an equal number in the experimental group. The results showed that compared with the original textbooks of D Middle School, the developed Junior Middle School Biology Inquiry Laboratory Manual helps to improve students' interest, attitude and grade performance, so the newly

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developed Junior High School Biology Inquiry Experiment Manual is effective. It helps to cultivate students' core quality of Biology.

Research Question 4. Difference between pretest and posttest scores of the students in Biology.

As revealed in Table 4, an increase of 16.8 or 96% results when the pretest score of 17.55 before the use of researcher-made Biology Activity Manual was compared to the posttest scores of 34.35 after the researcher-made Biology Activity Manual was employed. The result yielded a computed paired t-test value of -59.778 which means that the difference between the pretest and posttest scores is extremely strong. The negative sign indicates the direction of change, that is, Pretest minus posttest results to a negative sign which indicates that the posttest scores are higher than pretest scores. The p-value of 0.001 is less than the significance level of 0.05 suggesting that there is a statistically significant difference between the pretest scores and posttest scores of the students in Biology 7, hence the decision was to reject the null hypothesis. It implies that there is a highly significant improvement between the two tests. Students performed much better in the posttest. The improvement is statistically strong and consistent, which suggests that the researcher-made Biology Activity Manual is very effective in improving the scores of the Grade 7 students in Biology.

In the study of Maravilla (2024), pretest-posttest design was employed where the preliminary assessment indicated that most participants scored at the introductory level. Simultaneously, the post-test findings indicate that students achieved a competency level close to the expected standard after using the instrument. Similarly, in the present study the Grade 7 student respondents have prior knowledge on Biology and after the researcher-made Biology Activity Manual was employed the post-test scores of the Grade 7 students strongly improved.

Furthermore, Gregorio (2024) conducted a study to describe the experiences of the Science teachers teaching Biology in utilizing the Strategic Intervention Material (SIM) and to find out if there was a significant increase in the academic performance of the students using the SIM. The researcher used the pretest and post-test to determine the student's academic performance enhancement and analyzed the results using the paired-sample t-test. The results showed that there was a significant increase in the students' performance from the pretest to the posttest. The SIM was deemed beneficial in upgrading students' learning of the subject's content and increasing their academic performance.

Parallel study conducted on strategic intervention materials (SIMs) by Dalumpines (2023) explored its impact on enhancing the academic performance of Grade 7 science students. The findings demonstrated that students who utilized SIMs achieved notable improvements in their science knowledge and skills, as reflected in their stronger performance on subsequent assessments. The study emphasized the importance of SIMs in addressing specific learning gaps, making them an effective tool for improving student outcomes. Additionally, teachers appreciated these materials for enabling tailored and targeted instruction, which catered to the diverse levels of understanding within their classrooms.

Equivalently, Manseguiao (2025) examined the development and evaluation of contextualized learning packets aimed at improving Grade 7 students' understanding of

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ecosystems. Both teachers and students responded positively to these materials, praising their relevance, accuracy, and quality. Students noted that the packets enhanced their grasp of ecological concepts by linking theoretical ideas to practical, real-world scenarios. The study concluded that using contextualized learning materials rooted in local environmental contexts significantly boosted students' science comprehension and engagement, underscoring the value of tailoring educational resources to students' surroundings.

With reference to inquiry-based learning approach, a method usually employed by the researcher in her Biology Activity Manual, Tirol et al. (2021) investigated how the inquiry-based learning approach influenced Grade 6 students' performance and motivation in science subjects. The findings showed that students exposed to this method demonstrated substantial improvements in both their academic performance and their intrinsic motivation to learn. They participated more actively in classroom activities and exhibited a deeper comprehension of the scientific concepts being taught. The study concluded that inquiry-based learning encouraged students to take greater ownership of their learning experience, making the process more engaging, meaningful, and effective for them.

Likewise, according to Cannoy (2024), students engaged in inquiry-based learning activities exhibited significantly enhanced science process skills compared to their peers taught through traditional approaches. These improvements were particularly evident in areas such as observation, experimentation, data analysis, and forming conclusions. The findings emphasized the effectiveness of inquiry-based learning in fostering critical thinking and problem-solving abilities within science education. Additionally, the study suggested a detailed intervention strategy to better integrate inquiry-based methods into college-level science curricula.

Research Question 5. Difference in the pretest and posttest scores of the students when grouped according to the profile sex.

Table 5 shows the difference between the pretest and posttest scores of the students in Biology when grouped according to their demographic profile, specifically on sex. A computed t-test value of -1.899 resulted when the means of the pretest scores of male and female students were compared that yielded a p-value of 0.063 which is greater than the significance level of 0.05 indicating no significant difference in the pretest scores between the male and female students hence, the decision is not to reject the null hypothesis. There is no statistically significant difference between male and female students in the pretest. Even though the t-value is somewhat large (-1.899), it is not enough to reach significance. Male and female Grade 7 students had comparable prior knowledge and skills before they were exposed to the researcher-made Biology Activity Manual.

Similarly, the means in the posttest scores of the male and female students resulted to a t-test value of 0.033 that yielded a p-value of 0.974 which exceeded the significance level of 0.05 suggesting that no statistically significant difference exists in the posttest scores between the male and the female students, therefore, it led to the decision not to reject the null hypothesis. There is no difference at all between male and female students in the posttest. The t-value (0.033) is extremely close to zero, meaning the group means are almost identical. Male and female Grade 7 students performed equally well

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after using the researcher-made Biology Activity Manual. The activity manual was equally effective for both male and female students. The independent sample t-test revealed no significant difference between male and female students in the pretest ($t = -1.899$, $p = 0.063$) and posttest ($t = 0.033$, $p = 0.974$). This indicates that both groups had comparable performance before and after using the researcher-made Biology Activity Manual, suggesting that the treatment was equally effective regardless of sex.

In the study of Esther Etop, E et. al., (2023) where the influence of locally available instructional materials on Biology students' academic achievement was examined. The findings revealed that there is a significant influence of locally available instructional materials on Biology students' academic achievement. In addition, there was no significant influence of gender on the use of locally available instructional materials on Biology students' academic achievement.

Moreover, Santos, et.al., (2021) in their study of Least mastered competencies in Biology: Basis for instructional intervention stressed that that the analysis of ROSE (Relevance of Science Education) data indicates a difference in science-related affective variables based on gender. Boys' and girls' interests are different in context dependency and also in level of development, girls are more concerns than boys when it comes to environment, but boys are more aggressive than girls to become scientists and get a job. The respondents obtained "low mastery" in Grade 7 biology competencies with an overall mean of 2.44 (SD=0.49). There were also significant differences of students' least mastered competencies by school and sex.

Furthermore, the study by Taylor & Francis Group (2022) revealed that girls often achieved superior grades, even when they possessed equivalent intellectual qualifications to those of guys. An extensive study involving many students and teachers has revealed that ladies often achieve superior marks compared to guys with similar academic capabilities. When utilizing the outcomes of standardized assessments, which employ a predetermined scoring framework, it is often observed that females consistently surpass males in humanities, languages, and reading skills, while males excel in mathematics. Nevertheless, when educators evaluate academic performance, females consistently surpass males.

Research Question 6. Proposed Program based on the findings of the study.

Based on the findings of the study the following program is proposed. The program is provided with a rationale that deals with the objectives and overview of the program, overall flow of the program is presented in Table 6.

Rationale:

The PILLARIAN EDUCATORS on C.R.A.F.T.T. (Construction of Relevant and Functional Teaching Tools) Program was developed based on the study's results and conclusions. Through the careful creation, application, and assessment of inquiry-based activity manuals, it is intended to improve the quality of instruction. In keeping with the MATATAG curriculum, this program seeks to give educators the abilities and information they need to create educational resources that are not just in line with the required competencies but also interesting, relevant, and useful for students.

The pre-implementation stage, which consists of training workshops, curriculum reviews, seminars, and the actual creation of activity guides, guarantees that educators

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are ready to create resources that encourage students' critical thinking, creativity, and active learning. In order to guarantee that learning objectives are reached, the implementation phase places a strong emphasis on the efficient use of these manuals in regular classroom instruction along with ongoing monitoring of student participation, task completion, and engagement.

Finally, assessing learning gains, getting teacher and student input, evaluating results, and producing evidence-based suggestions for ongoing development are the main objectives of the post-implementation phase. The C.R.A.F.T.T. program aims to improve student learning outcomes, foster a culture of reflective practice and innovation within the school, and increase instructional effectiveness through the integration of teacher professional development, competency alignment, and structured evaluation.

Summary of Findings

Among the important findings of this research were:

1. Of the total 60 students, 35 or 58.3% were male while 25 or 41.7% are female. This shows that the male students outnumbered the female students.
2. Before the students were exposed to the researcher-made Biology Activity Manual 31 or 51.7% of the total 60 students obtained pre-test scores in the range of 11-20 categorized as Fairly satisfactory, 19 or 31.7% got score in the score range of 21-30 interpreted as Satisfactory performance while 10 students or 16.7% attained scores in the lowest score range of 0-10 described as Not meeting the expectations. The mean score of the students in the pretest is 17.55 described as Fairly satisfactory with a standard deviation of 6.00.
3. Out of 60 students 10 or 16.7% obtained post-test scores in the highest range of 41-50 described as Outstanding performance, 31 or 51.7% had scores in the range of 31-40 categorized as Very satisfactory while 19 or 31.7% got scores in the range of 21-30 with Satisfactory performance. The mean is 34.35 which suggests a Very satisfactory performance in the posttest in Biology and a standard deviation of 5.87 after the students were exposed to researcher-made Biology activity manual.
4. An increase of 16.8 or 96% results when the pretest score of 17.55 before the use of researcher-made Biology Activity Manual was compared to the posttest scores of 34.35 after the researcher-made Biology Activity Manual was employed. The result yielded a computed paired t-test value of -59.778 and a p-value of 0.001, which is less than the significance level of 0.05 suggesting that there is a statistically significant difference between the pretest scores and posttest scores of the students in Biology 7, hence the decision is to reject the null hypothesis.
5. A computed t-test value of -1.899 resulted when the means of the pretest scores of male and female students were compared that yielded a p-value of 0.063 which is greater than the significance level of 0.05 indicating no statistically significant difference in the pretest scores between the male and female students before the researcher-made Biology Activity Manual was employed, hence, the decision is not to reject the null hypothesis. Similarly, the means in the posttest scores of the male and female students resulted to a t-test value of 0.033 that yielded a p-value of 0.974 which exceeded the significance level of 0.05 suggesting that no statistically significant difference exists in the posttest scores between the male and the female students, therefore, it led to the decision not to reject the null

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hypothesis. There is no statistically significant difference between the male and female students in the posttest after the students were exposed to the researcher-made Biology Activity Manual.

6. A program, Construction of Relevant and Functional Teaching Tools (C.R.A.F.T.T.) was proposed based on the results of the study.

Conclusions

Based on the foregoing findings, the following conclusions were drawn:

1. The distribution of respondents indicates a higher proportion of male students (58.3%) compared to female students (41.7%) among the Grade 7 participants. This suggests that the study group is slightly male-dominated, which may influence group dynamics and learning interactions but does not, in itself, determine academic performance outcomes.
2. The Fairly satisfactory performance of the Grade 7 students in Biology before the researcher-made Biology Activity Manual was used indicates that the students already have some basic understanding of the Biology concepts which may come from previous lessons and general exposures to their surroundings. Since it is only fairly satisfactory, not mastery level, knowledge on Biology concepts is not yet deep or comprehensive, students may have misconceptions or gaps in key concepts. The students are not starting from zero, they have prior knowledge. But they are also not highly prepared, there is room for improvement. This indicates a need for instruction to enhance understanding and improve learning outcomes. So, the researcher developed the activity manual for Biology 7.
3. After the researcher-made Biology Activity Manual was employed to Grade 7 students there is a strong improvement among the students' performance in the posttest compared to the pretest scores. This implies that the researcher-made Biology Activity Manual is very effective in improving the scores of the Grade 7 students in Biology.
4. There is a highly significant improvement between the two tests, the pretest and posttest. Students performed much better in the posttest. The improvement is statistically strong and consistent, which suggests that the researcher-made Biology Activity Manual is very effective in improving the scores of the Grade 7 students in Biology.
5. The researcher-made Biology Activity Manual was equally effective for both male and female students. The independent samples t-test revealed no significant difference between male and female students in the pretest and posttest This indicates that both groups had comparable performance before and after using the researcher-made Biology Activity Manual, suggesting that the activity manual was equally effective regardless of sex.
6. Based on the findings of the study the PILLARIAN EDUCATORS on C.R.A.F.T.T. (Construction of Relevant and Functional Teaching Tools) Program was developed to enhance instructional quality through the creation and use of inquiry-based activity manuals aligned with the MATATAG curriculum. The program is composed of three implementing phases: Pre-implementation phase, Implementation phase, Post-implementation phase. The pre-implementation phase prepares teachers through training, curriculum review, seminars, and

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development of activity guides that promote critical thinking, creativity, and active learning. During implementation, teachers utilize the manuals in classroom instruction while monitoring student participation, task completion, and engagement. The post-implementation phase focuses on evaluating learning gains, gathering feedback, and providing evidence-based recommendations to improve instructional effectiveness and student learning outcomes.

Recommendations

In the light of the conclusions drawn from the study, the following are hereby recommended:

1. Future studies consider a more balanced gender representation to ensure broader generalizability of findings. Additionally, teachers may remain mindful of gender inclusivity in classroom strategies to ensure that both male and female students are equally engaged and supported in the learning process.
2. The researcher-made Biology Activity Manual contain topics appropriate for grade 7 level hence it can be use in Grade 7 level since it was found to be effective in improving the scores of the Grade 7 students in Biology.
3. The proposed program can be implemented by the school administrators and all teachers specifically Biology7 teachers.
4. The study's results and conclusions indicate that due to the limited sample size of sixty (60) respondents, it is recommended that all Grade 7 students in the school be included as respondents to enhance the study's reliability. Since the study revealed the effectiveness of using the Biology Activity Manual for enhancing Grade 7 science competencies, it is suggested that the study be conducted at a different grade level.
5. Subject teachers must consider making the activity manual's design to be creative and eye-catching for the students. The design and layout of the learning manual gives excitement for the students to read and use it.
6. The learning instructions is suggested to be student friendly. The use of simple words and sentences is encouraged to help the students understand the instructions well, and that they can independently do the activity with less supervision from the teacher.
7. School administrators may support the reproduction of the Biology Activity Manual, for this can help enhance science competencies and improve the learning outcomes of students in the school.
8. Training and seminars on creating instructional materials, workbooks, manuals, and modules are recommended for school administrators to train teachers to create instructional materials to help learners improve their learning outcomes.
9. The Subject Coordinators of different disciplines may also consider adopting the proposed CRAFTT Program in their department. The idea of integrating inquiry-based teaching using activity manual as learning resources could also help the students to improve their scores in other subjects. Additionally, teachers could develop their skills in creating engaging activities upon the completion of the program.
10. Curriculum designers should incorporate guides for practical activities that go with each topic in the curriculum so as to encourage the teachers to teach theory with

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practical application as a unified whole to increase students' understanding and internalization of the facts and ideas taught.

11. Future researchers may as well consider the Biology Activity Manual and incorporate it into their studies to further validate the study's findings. This could provide valuable insights and serve as a benchmark for further research.

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