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Development and Evaluation of Competency-Based Learning Resources for Grade 7 Life Science in the MATATAG Curriculum

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Abstract

Science education in the Philippines is undergoing significant transformation through the implementation of the Matatag Curriculum, which prioritizes competency-based instruction and curriculum alignment. Despite these changes, there remains a gap in the availability of instructional materials that meet these new standards, particularly in the area of Grade 7 Life Science. Addressing this gap is critical to improving student understanding and performance in science education. This study aimed to develop and evaluate competency-based learning resources for Grade 7 Life Science that are aligned with the Matatag Curriculum and designed to enhance students' academic performance and engagement. A mixed-methods quasi-experimental design was employed, involving 145 Grade 7 students from the MSEUF Basic Education Department. The students were divided into control and experimental groups. Pretest and posttest assessments were administered to measure academic performance. At the same time, expert validation, student surveys, and teacher feedback provided qualitative and quantitative data on the effectiveness and usability of the materials. The results revealed a statistically significant improvement in the posttest scores of the experimental group compared to the control group ($p < .001$), indicating the effectiveness of the developed resources. Expert evaluations yielded high ratings for content accuracy, clarity, instructional design, and learner appropriateness. Student feedback reflected strong engagement, while teacher comments emphasized the materials' accessibility, relevance, and support for differentiated instruction. The findings affirm the value of competency-based learning resources in supporting the goals of the Matatag Curriculum. The study recommends further application of such materials across different grade levels and schools, as well as the integration of digital formats to reach a wider range of learners.

Keywords: *competency-based learning resources, Matatag Curriculum, Grade 7 Life Science*

INTRODUCTION

To address the changing needs of the 21st century, the Department of Education (DepEd) launched the Matatag Curriculum in 2023 as a key reform to enhance the country's basic education system. Central to this curriculum is a Competency-Based Education (CBE) approach, which focuses on ensuring students master critical skills and knowledge for lifelong learning and active citizenship (DepEd, 2023). This shift reflects global educational trends that emphasize student-centered teaching, performance-driven assessments, and adaptable learning methods to cater to diverse student needs.

In science education, the Matatag Curriculum aims to boost scientific literacy, particularly in junior high school (Grades 7 and 8). It fosters critical thinking, problem-solving, and analytical skills through structured Most Essential Learning Competencies (MELCs), which serve as the basis for engaging with scientific concepts, inquiry-based learning, and real-world applications (Villanueva, 2022; Garcia, 2021).

However, implementing the Matatag Curriculum faces significant challenges, particularly the scarcity of well-designed, competency-aligned learning materials, especially in Science. Many teachers, particularly in Grades 7 and 8, struggle to find resources that match the MELCs and support varied teaching approaches (Cabral, 2020; Cruz, 2021). This issue is particularly acute in Grade 7 Life Science, where foundational biology concepts are introduced—a crucial building block for future science learning.

Current textbooks and supplementary materials often fail to meet CBE standards, lacking elements like active student participation, self-paced learning, and ongoing assessment—key components for competency mastery (Santos, 2022; Diaz et al., 2023). As a result, teachers must adapt or create materials independently, often without sufficient training, leading to inconsistent instruction and reduced student engagement. This may hinder students' ability to grasp scientific principles or connect them to real-life situations.

To bridge this gap, this study focused on designing, developing, and evaluating competency-based learning materials (CBLMs) for Grade 7 Life Science under the Matatag Curriculum. These resources were aligned with MELCs and structured to support mastery-based progression, allowing students to learn at their own pace with continuous feedback. Additionally, the materials included interactive tasks and real-world applications to develop scientific thinking and practical problem-solving skills (Cruz, 2021; Garcia & Soriano, 2022).

Using a quasi-experimental mixed-methods approach, the research assessed both the academic impact and usability of the CBLMs. Quantitative data from pre- and post-tests measured student performance, while qualitative feedback from teachers and students evaluated the materials' relevance, clarity, and effectiveness (Villanueva, 2022; Ramos & Bautista, 2023). This dual analysis ensures a thorough understanding of how the materials perform in actual classrooms.

Ultimately, this study aims to support the Matatag Curriculum's implementation by providing research-backed, competency-aligned resources for Grade 7 Science. By addressing the shortage of high-quality teaching materials, it sought to enhance both instructional quality and student achievement, contributing to the broader objectives of Philippine educational reform.

Purpose of the Research

The general objective of this study is to develop and evaluate competency-focused learning materials for the second quarter of Grade 7 Life Science that align with the Matatag Curriculum.

Specifically, it aimed to:

1. Identify the key competencies to be addressed in the Grade 7 Life Science Curriculum according to the Matatag Curriculum framework to guide the development of competency-based learning resources.

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2. Develop competency-based learning resources that align with the identified Most Essential Learning Competencies (MELCs) for Grade 7 Life Science and validate them through expert evaluation.
3. Implement and validate the developed competency-based learning resources through:
   3.1. An experimental group and compare their effectiveness with a control group (using traditional materials) by measuring students' understanding of Life Science concepts through pre-test and post-test results;
   3.2. Analyze the pre-test and post-test performance data to determine the effectiveness of the developed learning resources on student academic achievement, compare results from the experimental and control groups, and identify areas for improvement based on data and feedback; and
   3.3. Quantitative and qualitative feedback from teachers and students regarding the usability and effectiveness of the learning resources in enhancing student learning experiences.

Significance of the Research

This research on the development and evaluation of competency-based learning materials for Grade 7 Life Science at the MSEUF Basic Education Department during the 2024–2025 school year holds significant value for both students and teachers.

For Grade 7 students, the study aims to improve understanding and mastery of second quarter Life Science topics—such as [insert specific topics, e.g., "cell structure, reproduction, or biodiversity"—through learning resources designed in alignment with the Matatag Curriculum. By adopting a competency-based education (CBE) approach, these materials foster deeper engagement, encourage self-paced learning, and support the development of essential skills such as critical thinking and scientific reasoning. It is anticipated that this will lead to measurable improvements in academic performance, as assessed through formative and summative evaluations. More importantly, the learning tools are intended to empower students to apply scientific knowledge in both academic and real-world contexts, promoting lifelong learning and scientific literacy (Caplan & Stevens, 2020; Guskey, 2020).

For teachers, the study provides an opportunity to assess the effectiveness, clarity, and classroom suitability of the materials. Their active role in the evaluation process will help identify areas for refinement and support the customization of instruction to meet diverse student needs. This reflective practice fosters professional development and promotes a collaborative culture among science educators, where effective strategies and innovations can be shared and scaled across the department (McLeod, 2020). Furthermore, feedback gathered from teachers will inform the ongoing revision of both materials and curriculum, ensuring alignment with the goals of the Matatag Curriculum.

In essence, this study contributes to enhancing the overall educational experience of Grade 7 students in Life Science while offering data-driven insights for the continual improvement of teaching practices at MSEUF. The findings may also serve as a reference for other institutions aiming to implement competency-based approaches in science education.

METHODS

Research Design/Research Instrument/Data Gathering Procedures

This research utilized a quasi-experimental design to assess the efficacy of the created competency-based learning materials for Grade 7 Life Science in the Matatag Curriculum. A quasi-experimental design is suitable for this study because it facilitates the comparison of results between two existing groups: the experimental group that utilizes the created resources and the control group that uses conventional materials. This design is especially appropriate for educational environments where random assignment of participants is not possible, allowing for the intervention to be evaluated in a genuine classroom setting (Creswell & Creswell, 2018). Both groups took pre-tests and post-tests to evaluate how the learning resources affect students' academic outcomes.

To guarantee validity, the research tools, comprising the pre-tests and post-tests along with the teacher evaluation questionnaire, were created based on the Most Essential Learning Competencies (MELCs) and were validated by experts. Subject matter experts reviewed content to confirm that the items matched the learning objectives and effectively assessed the intended constructs. This expert review process confirmed both face and content validity. Furthermore, a pilot test of the tools was carried out with a group separate from the main research to refine ambiguous items and enhance clarity and coherence.

Reliability was evaluated by determining the internal consistency of the quantitative tools through Cronbach's alpha. Acceptable alpha values (≥ 0.70) confirmed that the items on the tests and questionnaire measured constructs reliably. The test-retest reliability for both the pre-tests and post-tests was evaluated to ensure the consistency of results over time.

Alongside the quasi-experimental design, the research employed a mixed-method approach, combining both quantitative and qualitative techniques to deliver a thorough assessment of the created resources. Quantitative data, obtained from self-assessment of students' mastery in Grade 7 Science learning competencies, pre-test and post-test scores, and the data from Likert-scale questionnaire for the teachers, provided quantifiable proof of the efficacy of the educational resources. Qualitative data gathered from teachers' comments offers extensive details regarding how well the resources match the curriculum, their effectiveness, and opportunities for enhancement. The integration of these approaches guarantees that the research encompasses both the statistical and contextual aspects of the intervention's effectiveness (Tashakkori & Teddlie, 2010).

This research used two main tools to assess the effectiveness of competency-based learning materials for Grade 7 Life Science. The initial tool is a Likert scale survey questionnaire created for educators teaching science. This survey questionnaire evaluated how well the learning materials met certain criteria in six important areas: matching content with learning objectives, clarity and structure, student engagement and motivation, suitability for teaching, visual appeal, impact on learning results, and additional feedback from the teachers. Educators' perceptions of the alignment and effectiveness of resources in classroom contexts were quantitatively assessed using a 5-point Likert scale ranging from 1 (Very Ineffective) to 5 (Highly Effective) for each item. Moreover, the teachers' additional feedbacks were qualitatively assessed according to theme. Likert scale surveys were acknowledged for gathering thorough, organized feedback on the usability and perceptions of educational materials, crucial for enhancing instructional design through iterative processes (Harpe, 2020).

The second instrument included a Likert-scale questionnaire on students' self-assessment of the Grade 7 Science learning competencies and pre-test and post-test assessments for Grade 7 students to measure academic improvements. The Likert-scale questionnaire served as the focal point for what specific competencies were addressed in crafting the learning materials. The pre-test served as a baseline measure of students' initial knowledge and understanding of the second quarter Life Science concepts. In contrast, the post-test, administered after the learning resources were used, assesses their progress and retention. Using pre-tests and post-tests in educational research is effective in demonstrating measurable outcomes associated with new instructional interventions, as it allows a comparison of learning gains attributable to the implemented resources (Creswell & Creswell, 2022; Bell et al., 2021). Together, these instruments

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provide a comprehensive assessment, drawing on educators' feedback for formative evaluation and student performance data for summative analysis.

The data collection process of this study was performed in several stages to ensure a methodical and dependable gathering of both quantitative and qualitative information in line with the research goals. This research employed four instruments: (1) a Likert-scale self-assessment questionnaire for students concentrating on Grade 7 Science learning skills, (2) a pre-test and post-test created by researchers to evaluate academic performance before and after using the learning materials, (3) a Likert-scale questionnaire for student feedback on the created learning resources, and (4) a Likert-scale assessment tool for teachers that included an open-ended comment section, which was analyzed thematically.

Before data collection, the tools were validated by experts to confirm content correctness, suitability, and connection with the Most Essential Learning Competencies (MELCs) in the Matatag Curriculum (Department of Education [DepEd], 2022). Experts in science education conducted validation to improve the tools' reliability and clarity (Creswell & Creswell, 2018). Afterward, official approval was requested from the principal of the Basic Education Department at Manuel S. Enverga University Foundation (MSEUF). In line with ethical guidelines for studies involving minors, informed consent was given, while assent was gathered from student participants (American Psychological Association [APA], 2020).

The initial stage of data collection included distributing the student self-assessment survey to determine which learning competencies Grade 7 Science students regarded as challenging. The responses acted as a reference for creating and producing the competency-focused learning resources. This stage guaranteed that the educational materials met the true requirements of the students and were based on their self-identified areas for enhancement (Boekaerts & Corno, 2005).

In the second stage, a pre-test was given to both the control and experimental groups to determine a baseline for students' academic performance. Subsequently, the created competency-focused learning resources were utilized in the experimental group, whereas the control group persisted with the conventional instructional materials. Following the implementation phase, a post-test was administered to both groups to assess learning improvements and determine the impact of the intervention. By comparing the results from before and after the test, the researcher was able to evaluate how the learning resources affected student performance.

The third phase included collecting responses from the students in the experimental group using a Likert-scale evaluation survey. This tool recorded the learners' views on the effectiveness, clarity, engagement, and correspondence of the learning resources with the desired skills. In the meantime, chosen Science educators utilized a distinct Likert-scale assessment tool to evaluate the quality, suitability, and efficacy of the created resources. Along with rating scales, educators offered written comments and recommendations, which underwent thematic analysis to uncover recurring themes and insights about the learning resources (Braun & Clarke, 2006).

All numerical data gathered from the surveys and assessments were examined using descriptive and inferential statistical methods, including mean, standard deviation, and paired sample t-tests, to identify patterns and noteworthy differences. Thematic analysis was utilized to analyze qualitative data from teacher feedback, yielding detailed insights that guided additional refinement of the materials. This mixed-methods strategy provided a thorough assessment of both student learning results and the teaching quality of the created resources.

Respondents/Units of Analysis/Subjects of the Study

The respondents included 145 Grade 7 students and 10 Science teachers from the MSEUF Basic Education Department (BED). The 145 students were divided into four sections: two sections (C and D) were assigned as the control group, where students used the conventional materials, while the other two sections (A and B) served as the experimental group, where students used the newly developed competency-based learning materials. This setup allows for a comparative evaluation of the effectiveness of the two sets of materials.

Additionally, ten Science teachers provided expert feedback on the alignment of the materials with the Most Essential Learning Competencies (MELCs) in the Matatag Curriculum and evaluated their instructional quality. This dual approach, involving both students and teachers, ensured a comprehensive evaluation that captures both learner-centered and instructional perspectives. The study aims to assess how well the learning resources support teaching and enhance student learning in Life Science, while also identifying areas for improvement through feedback from educators, thus providing a well-rounded evaluation of the developed materials (Creswell & Clark, 2017).

Sampling Design and Procedures

The study utilized a non-random purposive sampling method, appropriate for quasi-experimental investigations where random assignment is impractical. The study involved 145 Grade 7 students from four classes within the MSEUF Basic Education Department (BED) along with 10 Science teachers. Each of the four sections underwent a pre-test to determine baseline equivalence, with the outcomes informing the assessment of the intervention. The students were split into two groups: an experimental group made up of Sections A and B, which used the newly created competency-based learning resources, and a control group consisting of Sections C and D, which employed conventional learning resources.

The allocation of sections to experimental and control groups followed pre-established classroom divisions rather than being random, in accordance with the limitations of an actual educational environment. This method allows the research to evaluate the success of the created learning resources while preserving the established classroom interactions by incorporating all four sections in the pre-test and identifying Sections A and B as the experimental group. In contrast, Sections C and D serve as the control group. The study guaranteed a systematic comparison of learning results between the two teaching methods (Creswell & Clark, 2017).

Moreover, the 10 Science teachers were chosen on purpose due to their experience teaching Science and knowledge of the subject matter so that they can give well-informed feedback on the materials created. The educators provided perspectives on how well the resources align, are usable, and effective in addressing the Most Essential Learning Competencies (MELCs) of the Matatag Curriculum. This approach offered a thorough evaluation of the efficiency of competency-based materials and gave important information on how to use them in actual classroom environments (Creswell, 2014; Fielding & Thomas, 2016). Ethical considerations, such as participants willingly joining and giving informed consent, were adhered to in order to maintain confidentiality and uphold the integrity of the research.

Research Locale/Study Site

The study took place in the MSEUF Basic Education Department, focusing on Grade 7 and involving Science teachers. Because of its thorough execution of the Matatag Curriculum and varied student body, the Basic Education Department at MSEUF is an excellent research setting. This enabled a thorough

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evaluation of how well the newly created competency-based learning materials adhere to the curriculum's needs. The study utilized an authentic educational setting by working with Grade 7 students and teachers at this institution to test and improve the learning materials.

Assumptions or Hypotheses

This study on the development and assessment of competency-based learning resources in the second quarter for Grade 7 Life Science in the Matatag Curriculum, several assumptions and hypotheses guided the research design.

Assumptions include the belief that the newly developed competency-based learning resources will align with the Most Essential Learning Competencies (MELCs) and the Matatag Curriculum, reflecting the curriculum's goals and requirements (Department of Education, 2021). It is also assumed that Grade 7 Life Science teachers and students at MSEUF will actively engage with these resources and provide honest feedback, which is essential for obtaining valid and reliable data regarding the materials' effectiveness and usability (Creswell & Clark, 2017). Furthermore, it is assumed that the pilot testing phase will accurately reflect the real-world applicability of the learning resources, thus providing meaningful insights into their impact on student learning and teacher instruction (Teddlie & Yu, 2007).

However, the research also presented theories that were verified through experimentation. The null hypothesis (H_0) suggests that using competency-based learning resources will not result in a noticeable change in students' understanding of Life Science concepts, as shown by no significant difference in pre-test and post-test scores. On the other hand, the alternative hypothesis (H_1) proposes that there will be a notable increase in post-test results, showing that the educational materials aid in improving student learning. Statistical methods like a paired t-test were used to test the hypothesis, offering a clear way to assess the effects of the instructional materials created (Schwartz & Arena, 2021).

Research Paradigm/Conceptual Framework

This framework employed a two-stage methodological strategy. Phase 1 (Development) employed the Input-Process-Output (IPO) framework to create and verify competency-based educational resources grounded in MELCs, self-assessment outcomes of least mastered skills, and input from experts. Phase 2 (Implementation) utilized a quasi-experimental design to assess the created materials with Grade 7 students, analyzing pretest and posttest outcomes between control and experimental groups.

Figure 1 presents Phase 1 with Research and Development (R&D) using the IPO model. It follows the Input-Process-Output (IPO) model to guide the systematic development of competency-based learning materials for Grade 7 Life Science, aligned with the Most Essential Learning Competencies (MELCs) in the Matatag Curriculum.

The inputs for this phase include the curriculum guide for Grade 7 Science under the Matatag Curriculum, specifically the MELCs for Life Science. A key component was the administration of a self-assessment instrument to students, which aimed to identify the least mastered competencies. The results of this diagnostic tool served as a foundation for selecting the content areas that required targeted intervention. Additional inputs included a review of existing textbooks and learning materials to evaluate their adequacy in addressing the identified learning gaps. The theoretical underpinnings of the resource development were drawn from Competency-Based Education (CBE) and Constructivist learning principles, emphasizing

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learner-centered, mastery-focused instruction. Expert knowledge from science educators and curriculum specialists was also incorporated to ensure relevance and quality.

The development process involved multiple stages. First, the results of the student self-assessment were analyzed to pinpoint specific competencies in Life Science that students struggled with the most, such as cell structure, reproduction, heredity, and ecological interactions. Based on this data, the researcher designed content-rich and engaging learning materials that addressed these competencies through clear explanations, illustrations, activities, and formative assessments. Drafts of the materials were then subjected to expert review, where science teachers and subject specialists provided both qualitative and quantitative feedback regarding the clarity, appropriateness, and curriculum alignment of the content. Revisions were made based on this feedback to refine the instructional quality and ensure the materials were suitable for classroom implementation. The iterative development process emphasized contextualization, learner engagement, and alignment with mastery learning goals. The primary output of Phase 1 was a set of validated competency-based learning materials specifically designed to address the least mastered competencies in Grade 7 Life Science. These materials were developed to be flexible and responsive to diverse learner needs, promoting deeper understanding through guided discovery, practice tasks, and assessment opportunities. In addition, evaluation tools such as expert validation rubrics and teacher feedback summaries were produced to document the quality assurance process. The completion of this phase ensured that the instructional materials were ready for implementation and testing in the quasi-experimental phase of the study.

Figure 1

Phase 1: Research and Development (R&D) Using the IPO Model

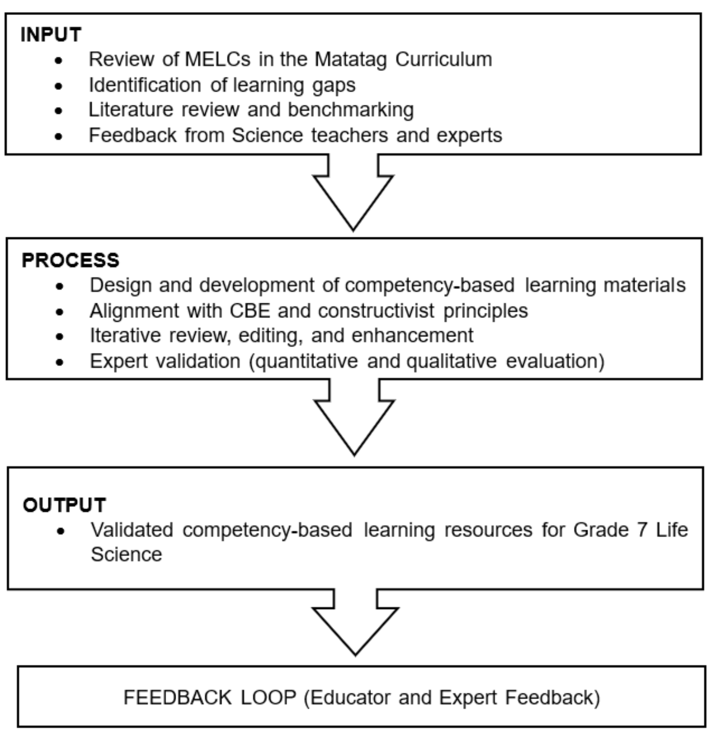

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Figure 2 presents the Phase 2, or the experimental phase, for the validation of learning material through quasi-experimental design. During the Input stage, the competency-centered learning resources created in Phase 1, founded on the Most Essential Learning Competencies (MELCs) of the Matatag Curriculum, are applied in Grade 7 Life Science classes. Students are divided into experimental and control groups, and a pretest is given to evaluate their initial comprehension (Gonzales, 2021).

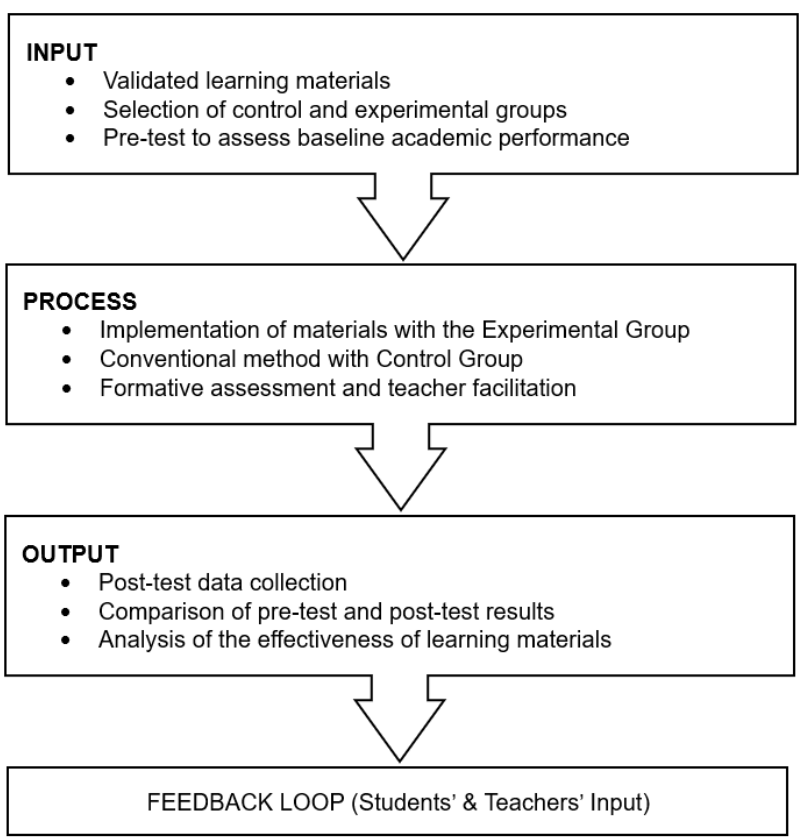
In the Process stage, the experimental group engages with the created materials using active, differentiated, and mastery-focused learning techniques. Educators offer ongoing formative assessments and feedback to direct learning, whereas the control group persists with conventional teaching techniques. This phase corresponds to the tenets of Constructivism and Competency-Based Education, guaranteeing that students grasp each concept prior to moving forward (Brown & Green, 2020; Gonzales, 2021).

During the Output stage, a post-test is given to both groups to assess their academic progress. The developed learning materials' effectiveness is assessed by comparing pre- and post-test results, concentrating on student understanding and mastery of the MELCs (Brown & Green, 2020).

The Feedback Loop finalizes the process by collecting insights from students and teachers about the educational resources. This input is applied to improve and upgrade the resources, making sure they are contextually appropriate, meet learner requirements, and align with curriculum objectives—thereby maintaining an ongoing improvement process (Gonzales, 2021; Brown & Green, 2020).

Figure 2

Phase 2: Experimental Phase (Validation of Learning Material Through Quasi-Experiment)



RESULTS AND DISCUSSION

This section provides an analysis of the pre-test and post-test data to evaluate the effectiveness of the developed competency-based learning resources for Grade 7 Life Science. It also explores feedback from teachers and students regarding the usability, relevance, and impact of the resources on student learning experiences.

Table 1 shows the demographic profile of students in the experimental and control groups. On average, students in both groups are around 12 years old, with the experimental group averaging 12.3 years and the control group 12.5 years. Gender distribution is fairly balanced, with a total of 74 males and 71 females. The average science grade is almost the same in both groups—89.2 for the experimental group and 89.4 for the control group. More students in the experimental group come from public schools (42), while the control group has more from private schools (48). The most common household income bracket for both groups falls between ₱10,001 and ₱30,000.

Table 1

Students' Demographic Profile

Demographic variable	Experimental	Control	Total
Age (Mean)	12.3	12.5	12.4
Gender (Male: Female)	39:34	35:37	74:71
Science Grade (Mean)	89.2	89.4	89.3
Type of School (Private: Public)	31:42	48:24	79:66
Household Income (Most Common Bracket)	₱10,001 - ₱30,000	₱10,001 -₱20,000	₱10,001 - ₱30,000

Table 2 presents the demographic profile of the teacher-respondents. Half of them (50%) are aged 25 to 34, while the rest are spread across older age groups. Most teachers (50%) have earned Master's degrees units, with others holding either a bachelor's degree (20%), a doctorate units (10%), or a full doctorate (20%). In terms of teaching experience, the majority have been teaching for 6 to 10 years (40%), followed by those with 11 to 15 years (30%). All respondents teach Life Science or Biology, while a large portion also teach Earth Science (80%), Chemistry (60%), and Physics (60%).

Table 2

Demographic Profile of the Teachers

Category	n	Percentage
Age Group		
25-34	5	50

35-44	3	30
45-54	2	20
Educational Background		
Bachelor's Degree	2	20
With MA Units	5	50
With Doctorate Units	1	10
Doctorate Degree	2	20
Teaching Experience		
0-5 years	1	10
6-10 years	4	40
11-15 years	3	30
16-20 years	2	20
Subjects Taught		
Life Science/Biology	10	100
Earth Science	8	80
Chemistry	6	60
Physics	6	60

Table 3 presents the analysis of student comprehension for Grade 7 Science learning competencies across four quarters: Chemistry, Life Science, Physical Science, and Earth Science. The entire range of subject areas exists within the "Limited Understanding" category from 1.00 to 1.75 because students experience major challenges when learning essential scientific concepts. The lowest average mean score of 1.44 exists in Life Science, which demonstrates that this subject presents the greatest learning difficulty for students. Students experienced the most difficulty learning about cell structure, together with reproduction and energy transfer through trophic levels. Research by Talan and Talan (2021) confirms this finding because their study demonstrated that students need concrete learning materials to understand abstract biological concepts. Villamayor and Sumayang (2020) stressed that competency-based learning resources serve as essential tools to address learning deficiencies in Life Science during Junior High School. The findings demonstrate the necessity of developing specific competency-based learning materials to enhance Life Science student achievement within the Matatag Curriculum.

Table 3

Analysis Based on the List of Learning Competencies in Grade 7 Science

Competencies	M	SD	Qualitative description
First Quarter (Chemistry)			

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1. Recognize that scientists use models to explain phenomena that cannot be easily seen or detected	1.38	0.49	Limited understanding
2. Describe the Particle Model of Matter as "All matter is made up of tiny particles with each pure substance having its own kind of particles."	1.54	0.5	Limited understanding
3. Describe that particles are constantly in motion, have spaces between them, attract each other, and move faster as the temperature increases (or with the addition of heat)	1.58	0.5	Limited understanding
4. Use diagrams and illustrations to describe the arrangement, spacing, and relative motion of the particles in each of the three states (phases) of matter	1.39	0.49	Limited understanding
5. Explain the changes of state in terms of particle arrangement and energy changes: a. solid → liquid → vapor, and b. vapor → liquid → solid	1.47	0.5	Limited understanding
6. Follow the appropriate steps of a scientific investigation, which include: a. Aim or problem, b. Materials and equipment, c. Method or procedures, d. Results including data, and e. Conclusion	1.26	0.44	Limited understanding
7. Make accurate measurements using standard units for physical quantities and organize the collected data when carrying out a scientific investigation	1.36	0.48	Limited understanding
8. Identify the role of the solute and solvent in a solution	1.49	0.5	Limited understanding
9. Express quantitatively the amount of solute present in a given volume of solvent	1.61	0.49	Limited understanding
10. Demonstrate how different factors affect the solubility of a solute in a given solvent, such as heat	1.42	0.49	Limited understanding
11. Identify solutions, which can be found at home and in school, and that react with litmus indicator, as acids, bases, and salts	1.49	0.5	Limited understanding
12. Demonstrate proper use and handling of science equipment	1.47	0.5	Limited understanding
Average	**1.46**	**0.49**	**Limited understanding**
Second Quarter (Life Science)			
1. Identify the parts and functions, and demonstrate proper handling and storing of a compound microscope	1.58	0.50	Limited understanding
2. Use proper techniques in observing and identifying the parts of a cell with a microscope, such as the cell membrane, nucleus, cytoplasm, mitochondria, chloroplasts, and ribosomes	1.35	0.48	Limited understanding
3. Recognize that some organisms consist of a single cell (unicellular), like bacteria, and some consist of many cells (multicellular), like a human	1.45	0.50	Limited understanding
4. Differentiate plant and animal cells based on their organelles	1.25	0.43	Limited understanding
5. Recognize that cells reproduce through two types of cell division, mitosis and meiosis, and describe mitosis as cell division for growth and repair	1.35	0.48	Limited understanding

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6. Explain that genetic information is passed on to offspring from both parents by the process of meiosis and fertilization	1.47	0.50	Limited understanding
7. Differentiate sexual from asexual reproduction in terms of: a) number of parents involved, and b) similarities of offspring to parents	1.60	0.49	Limited understanding
8. Use a labelled diagram to describe the connections between the levels of biological organization to one another, from cells to the biosphere	1.42	0.49	Limited understanding
9. Describe the trophic levels of an organism as levels of energy in a food pyramid	1.49	0.50	Limited understanding
10. Use examples of food pyramids to describe the transfer of energy between organisms from one trophic level to another	1.47	0.50	Limited understanding
Average	**1.44**	**0.49**	**Limited understanding**
Third Quarter (Physical Science)			
1. Identify that forces act between objects and can be measured	1.52	0.50	Limited understanding
2. Identify and describe everyday situations that demonstrate: a. balanced forces such as a box resting on an inclined plane, a man standing still, or an object moving with constant velocity; b. unbalanced forces, such as freely falling fruit or an accelerating car	1.52	0.50	Limited understanding
3. Draw a free-body diagram to represent the relative magnitude and direction of the forces involving balanced and unbalanced forces	1.46	1.46	Limited understanding
4. Identify that when forces are not balanced, they can cause changes in the object's speed or direction of motion	1.61	0.49	Limited understanding
5. Explain the difference between distance and displacement in everyday situations in relation to a reference point	1.51	0.50	Limited understanding
6. Distinguish between speed and velocity using the concept of vectors	1.63	0.48	Limited understanding
7. Describe uniform velocity and represent it using distance-time graphs	1.58	0.49	Limited understanding
8. Explain the difference between heat and temperature	1.62	0.49	Limited understanding
9. Identify advantageous and disadvantageous examples of conduction, convection, and radiation	1.48	0.50	Limited understanding
10. Explain in terms of the particle model the processes underlying convection and conduction of heat energy	1.39	0.49	Limited understanding
11. Gather information from secondary sources to identify and describe examples of innovative devices that can be used to transform heat energy into electrical energy	1.49	0.50	Limited understanding
Average	**1.53**	**0.58**	**Limited understanding**
Fourth Quarter (Earth Science)			
1. Classify geological faults according to the angle of the fault plane and direction of slip	1.57	0.50	Limited understanding

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2. Use models or illustrations to explain how movements along faults generate earthquakes, and identify and explain which types of faults are most likely to occur in the Philippines, and explain why	1.51	0.50	Limited understanding
3. Describe how the effects of earthquakes on communities depend on their magnitude	1.57	0.50	Limited understanding
4. Use the PHIVOLCS FaultFinder or other reliable information source to identify where the nearest fault system is located from their community and assess the risk of earthquakes to their local community	1.55	0.50	Limited understanding
5. Make models of fault scenarios to illustrate: a. the epicenter of an earthquake from its focus, b. the intensity of an earthquake from its magnitude, and c. how underwater earthquakes may or may not generate tsunamis	1.57	0.50	Limited understanding
6. Refer to the local disaster readiness plans to demonstrate what to do during and after an earthquake	1.54	0.50	Limited understanding
7. Explain how earthquakes result in tsunamis that devastate shoreline communities	1.55	0.50	Limited understanding
8. Describe procedures that the authorities have in place to alert communities of pending tsunamis and what procedures can be implemented should a tsunami impact a community	1.51	0.50	Limited understanding
9. Explain how energy from the Sun interacts with the atmosphere	1.48	0.50	Limited understanding
10. Make a physical model or use drawings to demonstrate how the tilt of the Earth relative to its orbit around the Sun affects the intensity of sunlight absorbed by different areas of Earth over a year	1.51	0.50	Limited understanding
11. Explain, using models, how the tilt of the Earth affects the changes in the length of daytime at different times of the year	1.53	0.50	Limited understanding
12. Explain how solar energy contributes to the occurrence of land and sea breezes, monsoons, and the Intertropical Convergence Zone (ITCZ)	1.39	0.49	Limited understanding
Average	**1.52**	**0.50**	**Limited understanding**

Legend:

3.26 – 4.00 Excellent understanding

2.51 – 3.25 Good understanding

1.76 – 2.50 Basic understanding

1.00 – 1.75 Limited understanding

According to Table 4, the expert evaluation of the Competency-Based Learning Resources (CBLR) for Grade 7 Life Science received an overall score of 4.80, categorizing it as "Highly Effective." Each of the six categories—content alignment, clarity, engagement, usability, visual quality, and effectiveness in aiding learning outcomes—scored highly. The highest rating was for Content Alignment (M = 4.94), indicating that the educational materials were effectively aligned with the essential learning competencies in the Matatag Curriculum. Nevertheless, Visual and Aesthetic Quality recorded the least average (M =

4.52), with particular indicators like color schemes and layout obtaining marginally lower ratings. This indicates a requirement to enhance the design elements of the materials.

Enhancing the visual aspects is crucial since captivating and clear imagery aids students in comprehending and remembering scientific ideas more effectively. According to Tomczak et al. (2023), clear and well-structured visuals can boost motivation and concentration in science education. Furthermore, Odeyemi and Aladejana (2022) discovered that thoughtfully crafted, interactive materials in Science lessons enhance student engagement and curiosity. Thus, although the material in the resources is robust, improving the visual design will further enhance their effectiveness for student learning.

The findings of this study suggest that improving the visual quality of educational materials related to the Matatag Curriculum could greatly enhance their effectiveness in conveying the curriculum's core competencies, especially concerning engagement and learning outcomes. This is consistent with the curriculum's focus on promoting engaging, student-centered settings, where learners are actively involved in their educational journey. By enhancing the visual design features, the materials may better align with the Matatag Curriculum principles, leading to a more engaging and effective learning experience.

In the end, the findings highlight the significance of ongoing enhancement in the content and design of competency-focused learning materials. Guaranteeing that the visual design corresponds with the educational objectives of the curriculum is likely to lead to increased student engagement, improved learning results, and more significant educational experiences in science education.

Table 4

Expert Validation Ratings of the Competency-Based Learning Resources for Grade 7

Section 1: Content alignment with learning competencies	M	SD	Qualitative description
1. Identifies and explains the parts and functions of a compound microscope	5.00	0.00	Highly Effective
2. Demonstrates proper techniques for handling and storing a compound microscope	4.90	0.32	Highly Effective
3. Provides clear instructions on using a microscope to observe and identify cell parts	4.90	0.32	Highly Effective
4. Differentiates between unicellular and multicellular organisms	4.90	0.32	Highly Effective
5. Explains the differences between plant and animal cells based on their organelles	5.00	0.00	Highly Effective
6. Covers the process of mitosis and meiosis, especially in relation to growth and repair	4.90	0.32	Highly Effective
7. Explains how genetic information is passed through meiosis and fertilization	5.00	0.00	Highly Effective
8. Differentiates between sexual and asexual reproduction effectively	5.00	0.00	Highly Effective
9. Illustrates biological organization from cells to the biosphere clearly	4.90	0.32	Highly Effective

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	M	SD	Qualitative description
10. Describes the transfer of energy through trophic levels in a food pyramid	4.90	0.32	Highly Effective
Average	**4.94**	**0.19**	**Highly Effective**
Section 2: Clarity and organization	**M**	**SD**	**Qualitative description**
1. Clearly structured and easy to understand	4.89	0.33	Highly Effective
2. Well-organized, with logical sequencing of concepts	4.89	0.33	Highly Effective
3. Concise and free from unnecessary complexity	4.89	0.33	Highly Effective
4. Effective in comparing plant and animal cells, making distinctions clear	4.89	0.33	Highly Effective
5. Step-by-step explanation of mitosis and meiosis, aiding comprehension	4.78	0.44	Highly Effective
6. Logically structured in differentiating sexual and asexual reproduction	5.00	0.00	Highly Effective
7. Clearly labeled and systematically organized in diagrams and visuals	5.00	0.00	Highly Effective
8. Presented in a way that supports easy recall and application	4.89	0.33	Highly Effective
Average	**4.90**	**0.26**	**Highly Effective**
Section 3: Engagement and student motivation	**M**	**SD**	**Qualitative description**
1. Engages students through interactive and hands-on activities	4.78	0.44	Highly Effective
2. Encourages student participation in microscope-based observations	4.89	0.33	Highly Effective
3. Stimulates curiosity about unicellular and multicellular organisms	4.78	0.44	Highly Effective
4. Motivates students to explore plant and animal cell structures further	4.78	0.44	Highly Effective
5. Encourages active learning in understanding mitosis and meiosis	4.78	0.44	Highly Effective
Average	**4.80**	**0.42**	**Highly Effective**
Section 4: Usability for teaching	**M**	**SD**	**Qualitative description**
1. Is easy to integrate into classroom instruction	5.00	0.00	Highly Effective
2. Provides clear and user-friendly teaching guides	4.60	0.70	Highly Effective
3. Supports differentiated instruction for diverse learning needs	4.60	0.52	Highly Effective
4. Offers structured activities that promote engagement	4.80	0.42	Highly Effective
5. Enhances teaching through effective visual and diagrammatic aids	4.80	0.42	Highly Effective
Average	**4.76**	**0.41**	**Highly Effective**
Section 5: Visual and aesthetic quality	**M**	**SD**	**Qualitative description**

1. Contains high-quality, clear, and well-defined visuals	4.70	0.48	Highly Effective
2. Uses appropriate and visually appealing color schemes	4.20	0.63	Highly Effective
3. Has a well-organized layout that enhances readability	4.40	0.52	Highly Effective
4. Includes graphics that contribute meaningfully to the content	4.60	0.52	Highly Effective
5. Aligns visual elements with the learning objectives	4.70	0.48	Highly Effective
Average	**4.52**	**0.53**	**Highly Effective**
Section 6: Effectiveness in supporting learning outcomes	**M**	**SD**	**Qualitative description**
1. Aligns well with intended learning outcomes	5.00	0.00	Highly Effective
2. The material includes assessments that accurately measure student progress	4.90	0.32	Highly Effective
3. Develops targeted skills through engaging activities	4.70	0.48	Highly Effective
4. Encourages the application of knowledge in real-world contexts	4.80	0.42	Highly Effective
5. Supports critical thinking and problem-solving	4.90	0.32	Highly Effective
6. Provides opportunities for reflection and self-assessment	5.00	0.00	Highly Effective
7. Facilitates mastery of concepts before progressing to new topics	4.90	0.32	Highly Effective
8. Offers differentiated pathways to accommodate varying student needs	4.80	0.42	Highly Effective
9. Has the potential to improve student performance based on content quality.	4.90	0.32	Highly Effective
Average	**4.88**	**0.29**	**Highly Effective**
General Average	**4.80**	**0.35**	**Highly Effective**

Legend:

4.21 – 5.00 Highly Effective

3.41 – 4.20 Very Effective

2.61 – 3.40 Moderately Effective

1.81 – 2.60 Less Effective

1.00 – 1.80 Not Effective

As shown in Table 5, the findings from the statistical analysis of the pre-test scores for the experimental and control groups indicate that the two groups had comparable starting points. The experimental group obtained an average score of 12.60 (SD = 3.44), whereas the control group reached a comparable score of 12.20 (SD = 3.51). The test statistic of 0.551, along with 118 degrees of freedom,

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resulted in accepting the null hypothesis (Ho), suggesting that there is no statistically significant difference in pretest scores between the two groups. This finding indicates that both groups possessed similar initial knowledge of the topic prior to the intervention.

From a theoretical standpoint, this finding underscores the necessity of setting a controlled baseline in educational research, guaranteeing that any variations noted in posttest scores can be credited to the intervention. According to Constructivist Learning Theory, which highlights the importance of existing knowledge and experiences in acquiring new information (Piaget, 1950), this result guarantees that initial differences in comprehension do not cause the variations seen after the intervention. Instead, it emphasizes that the teaching strategy, particularly the incorporation of competency-based learning materials, is crucial in improving student learning results.

In terms of practical implications, the lack of significant pretest differences indicates that both groups began the study with relatively equal knowledge levels, affirming the validity of the research design. This result further suggests that any differences observed in the posttest scores can be confidently attributed to the effectiveness of the intervention, the experimental resources designed for Grade 7 Life Science in the Matatag Curriculum. The Matatag Curriculum, with its emphasis on competency-based education, is clearly supported by the findings. The curriculum's focus on equitable student learning outcomes is underscored by the fact that both groups began at similar levels of performance, reinforcing that interventions aligned with MELCs can have a positive impact on all students, regardless of their starting point.

From the perspective of science education, this result speaks to the critical importance of ensuring equitable access to quality learning materials. Since both groups were on par before the intervention, the observed improvements in the experimental group can be directly attributed to the competency-based materials designed to support active engagement and deeper understanding of scientific concepts. These findings align with best practices in science education, where instructional tools and resources are critical in bridging knowledge gaps and improving student engagement with the subject matter (Bransford et al., 2000).

Table 5

Significant Difference Between the Mean Scores of the Pre-test Results

	n	Mean	SD	Stat	df	Decision
Pretest				0.551	118	Accept the Ho
Experimental Group	60	12.60	3.44			
Control Group	60	12.20	3.51			

Note. p is significant if *<.05, **<.01, ***<.001

Table 6 presents the results of the pre-test and post-test for both the experimental and control groups, revealing significant insights into the effectiveness of competency-based learning resources in Grade 7 Life Science. Initially, both groups demonstrated poor academic performance, with the majority of students falling under the "Very Poor" category (83.3% in the control group and 81.7% in the experimental group). This supports prior findings by Dela Cruz and Fontanilla (2022) and Espinosa et al. (2021), which suggest that students struggle with Science concepts due to a lack of aligned and competency-based instructional materials. However, after the intervention, the experimental group exhibited substantial improvement. A combined 53.3% of students scored within the "Excellent" and "Very Good" ranges in the post-test, while only 10% of the control group reached these levels. These outcomes validate the theoretical foundations of Biggs and Tang's (2011) alignment model and Ogu and Schmidt's (2009) emphasis on interactive, learner-centered resources.

In terms of practical implications, the findings demonstrate the value of integrating tailored learning materials that are responsive to students' cognitive levels, encouraging mastery learning through scaffolded instruction. For Science education as a discipline, this reinforces the importance of curriculum-resource alignment and active learning strategies in improving learner outcomes. In the context of the Matatag Curriculum, the positive shift in the experimental group underscores the critical role of competency-based resources in supporting its objective of delivering inclusive, relevant, and future-ready education. Hence, the development and implementation of well-aligned instructional tools are not only timely but necessary for transforming Life Science teaching in Philippine basic education.

Table 6

Comparison of Pre-Test and Post-Test Results of the Experimental and Control Groups

Classification	**Score percentage**	**Experimental group**				**Control group**			
		Pre-test	**%**	**Post-test**	**%**	**Pre-test**	**%**	**Post-test**	**%**
Excellent	91–100	0	0	17	28.3	0	0	0	0
Very Good	81–90	0	0	15	25	0	0	5	8.3
Good	71–80	0	0	15	25	1	1.7	8	13.3
Fair	61–70	3	5	9	15	4	6.7	6	10
Poor	51–60	8	13.3	3	5	5	8.3	14	23.3
Very Poor	≤50	49	81.7	1	1.7	50	83.3	27	45
Total		**60**	**100**	**60**	**100**	**60**	**100**	**60**	**100**

Table 7 displays the assessment results of the created competency-based learning materials as evaluated by the experimental group. The overall average score of 4.22, viewed as "Strongly Agree," indicates that students perceived the material as very effective in aiding their understanding of Life Science. Of the five criteria, Organization and Layout achieved the highest average (M = 4.29), emphasizing the clarity of instructions, the tidiness of content, and the usefulness of images and diagrams. Engagement and Motivation were closely tied (M = 4.27), suggesting that the resource effectively maintained students' interest and motivated them to finish tasks. Simultaneously, Clarity and Relevance of Content and Assistance for Learning also obtained positive ratings, affirming that the materials corresponded with classroom content and facilitated understanding. These results align with the research of McTighe and Wiggins (2012), who highlighted that effective learning materials need to be both captivating and in sync with learning goals. Additionally, the outcomes reflect the conclusions of Richey, Klein, and Tracey (2011), who observed that instructional resources that are understandable, pertinent, and inspiring greatly enhance learner satisfaction and effectiveness in competency-focused environments.

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The outcomes also hold direct significance for the Matatag Curriculum, which emphasizes learner-centered and competency-based teaching. The favorable student perceptions suggest that the created materials successfully back the curriculum's goal of fostering lasting comprehension through genuine, well-organized, and inspiring experiences. In reality, these results indicate that science teachers ought to emphasize creating materials that combine clear visual design, engaging learning activities, and connections to real-world situations—all essential to the Matatag Curriculum's method in Life Science education. For the wider field of science education, the information indicates that effectively crafted competency-based materials not only enhance learning results but also promote greater engagement and favorable attitudes toward science, essential for developing scientifically literate students.

Table 7

Experimental Group Evaluation of the Developed Learning Resources

Criteria	M	SD	Verbal description
Clarity and relevance of content			
1. The lessons are easy to understand.	4.21	1.12	Strongly Agree
2. The content matches what we are learning in class.	4.36	1.09	Strongly Agree
3. The material uses simple words that are easy to follow.	4.21	1.10	Strongly Agree
4. The topics are explained in a way that I can easily remember.	4.23	1.11	Strongly Agree
5. The resource helped me see how the topic is used in real life.	4.19	1.06	Agree
Average	**4.24**	**1.10**	**Strongly Agree**
Organization and layout			
1. The content is organized in a way that is easy to follow.	4.28	0.99	Strongly Agree
2. The headings and sections are clear.	4.26	0.97	Strongly Agree
3. The pages are neat and easy to read.	4.26	0.97	Strongly Agree
4. The images and diagrams helped me understand the topic better.	4.28	1.04	Strongly Agree
5. The instructions for activities are easy to understand.	4.38	0.95	Strongly Agree
Average	**4.29**	**0.98**	**Strongly Agree**
Engagement and motivation			
1. The learning material kept me interested.	4.23	1.00	Strongly Agree
2. I enjoyed using this resource for learning.	4.23	0.89	Strongly Agree
3. The activities made me want to learn more.	4.28	0.93	Strongly Agree
4. The resource made learning more fun.	4.30	0.88	Strongly Agree
5. I felt motivated to complete the tasks in the material.	4.30	1.00	Strongly Agree
Average	**4.27**	**0.94**	**Strongly Agree**
Support for learning			
1. This resource helped me understand the topic better.	4.06	1.11	Agree
2. The examples helped me answer the questions correctly.	4.21	1.06	Strongly Agree
3. The material helped me remember what we learned in class.	4.17	1.13	Agree
4. The activities allowed me to think deeply and solve problems.	4.15	1.10	Agree
5. It prepared me well for quizzes and tests.	4.17	1.17	Agree
Average	**4.15**	**1.11**	**Agree**
Overall usefulness and satisfaction			

1. This resource was useful in learning Life Science.	4.11	1.17	Agree
2. I would recommend this learning material to other students.	4.09	1.10	Agree
3. I would like to use similar resources in the future.	4.11	1.15	Agree
4. I am happy with the quality of the material.	4.19	1.14	Agree
5. This resource made learning easier for me.	4.21	1.16	Strongly Agree
Average	**4.14**	**1.14**	**Agree**
General Average	**4.22**	**1.05**	**Strongly Agree**

Legend: 4.21 – 5.00 Strongly Agree 1.81 – 2.60 Disagree

3.41 – 4.20 Agree 1.00 – 1.80 Strongly Disagree

2.61 – 3.40 Neutral

Table 8 displays the emerging themes and insights collected from teacher evaluators who evaluated the created learning resources. A key theme that stands out is Accessibility and Engagement, as educators proposed employing QR codes and interactive quizzes to boost student involvement and facilitate access. This corresponds with Koole's (2009) findings, which highlighted that incorporating mobile-compatible and interactive elements enhances student involvement and content accessibility. Likewise, Real-Life Connections surfaced as a crucial theme, as evaluators highlighted the significance of linking lesson material with daily experiences to aid students in grasping abstract concepts. Herrington et al. (2010) state that genuine learning activities reflecting real-life situations greatly enhance understanding and learner engagement.

Another key theme is Varied Learning Methods, highlighting the significance of employing various techniques like visuals, practical activities, and diverse evaluations to address different learning preferences. This demonstrates the efforts of Tomlinson (2014), who supports differentiated instruction to address individual student needs and encourage inclusive education. Teacher feedback further underscored Critical Thinking and Reflection, stressing the importance of thoughtfully designed reflection prompts and discussions to enhance students' higher-order thinking abilities—aligning with Bloom’s revised taxonomy as outlined by Anderson and Krathwohl (2001), which emphasizes the significance of analyzing, evaluating, and creating.

The last two themes—Scaffolding and Differentiation and Enrichment and Independent Learning—show a significant focus on tailoring instruction and fostering learner independence. Educators observed the benefits of scaffolded inquiries and different pre-assessments in catering to various readiness levels, aligning with Vygotsky’s (1978) concept of the Zone of Proximal Development. Furthermore, their request for enrichment activities encourages a more profound investigation beyond the standard curriculum, consistent with the insights of Gentry and Springer (2002), who highlighted the significance of autonomous learning chances in nurturing student development and curiosity.

Table 8

Teacher Evaluators' Feedback on the Developed Learning Resources

Themes	Comments
Accessibility and Engagement	Suggestions for using QR codes and interactive quizzes indicate a desire to make learning materials more accessible and engaging for students.

Real-Life Connections	Emphasizing the importance of real-life examples demonstrates the need for learning to be relevant and relatable, which enhances student understanding.
Diverse Learning Approaches	The call for various formats in assessments, practice exercises, and the use of visuals and hands-on experiences highlights the crucial role of diverse instructional strategies in meeting different learning styles and paces.
Critical Thinking and Reflection	Well-crafted reflection questions and the encouragement of meaningful discussions signify a focus on developing higher-order thinking skills among students.
Scaffolding and Differentiation	Recommendations for scaffolded questions and diverse pre-assessment formats point to the importance of differentiating instruction to cater to individual student needs.
Enrichment and Independent Learning	The mention of enrichment activities promotes the idea of fostering independent exploration and deeper learning.

Table 9 displays the results of the paired t-test that compares the pretest and posttest scores from both the experimental and control groups. In the experimental group, a notable rise was observed from the pretest mean of 12.60 (SD = 3.44) to the posttest mean of 24.60 (SD = 3.80), yielding a t-value of 19.92 ($p < .001$), which shows a remarkably significant enhancement in performance. Likewise, the control group exhibited a statistically significant improvement from a pretest mean of 12.20 (SD = 3.51) to a posttest mean of 16.90 (SD = 5.27), yielding a t-value of 9.96 ($p < .001$). Nonetheless, the experimental group demonstrated significantly more progress than the control group, indicating the substantial positive impact of the created competency-based learning materials. This outcome aligns with the conclusions of Biggs (2011), who highlighted the importance of constructive alignment in instructional design to enhance learning results. Additionally, Bransford, Brown, and Cocking (2000) assert that learning resources that are organized, stimulating, and related to existing knowledge greatly improve student comprehension and memory. Therefore, the significant learning improvements seen in the experimental group confirm the efficacy of the created materials in enhancing meaningful learning.

The implications of these results are especially significant for both science education and the Matatag Curriculum. Regarding practice, the data indicates that competency-based learning materials, when effectively aligned with curriculum objectives and designed around student-focused learning theories, greatly enhance the understanding of Life Science concepts. In science education as a field, this offers empirical backing for incorporating instructional design principles that emphasize active participation, cognitive significance, and quantifiable results. Particularly concerning the Matatag Curriculum, which focuses on competency-based, formative, and inquiry-oriented learning, the significant enhancement in student performance confirms the curriculum's path. It underscores the necessity of creating contextually appropriate and pedagogically effective resources. The research shows that matching instructional design with essential competencies and learner requirements leads to enhanced science teaching and learning outcomes.

Table 9

Paired T-Test Result of the Pre-Test and Post-Test of the Experimental and the Control Groups

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	n	Mean	SD	Stat	df	Decision
Experimental Group				19.92**	59	Reject the Ho
Pre-test	60	12.60	3.44			
Post-test	60	24.60	3.80			
Control Group				9.96***	59	Reject the Ho
Pre-test	60	12.20	3.51			
Post-test	60	16.90	5.27			

Note. p is significant if *<.05, **<.01, ***<.001

Summary of the Findings

The main aim of this research was to pinpoint the essential competencies in the Grade 7 Life Science curriculum within the Matatag framework. From the examination of the outlined learning competencies (Table 3), various essential competencies were recognized that correspond with the Most Essential Learning Competencies (MELCs), establishing a solid base for creating resources focused on competency-based learning. The examination identified particular fields in Life Science that needed enhancement, especially in subjects concerning ecosystems, heredity, and human biology. This directed the creation of resources that filled content gaps and guaranteed consistency with curriculum standards.

To achieve the second goal, expert validation (Table 4) was performed on the created learning materials, yielding high scores in essential aspects like content accuracy, instructional quality, and suitability for the learner's level. Teacher respondents expressed strong consensus regarding the clarity and structure of the content, with average scores between 4.20 and 4.50. These results align with the suggestions of Wiggins and McTighe (2005), who highlight the significance of backward design and alignment to learning outcomes in effective curriculum development, along with O'Keeffe et al. (2021), who stress the necessity of instructional alignment for student success.

The third goal was tackled by evaluating the performance of students utilizing the competency-based learning resources (experimental group) against those who used conventional materials (control group). Tables 5 and 6 indicate that both groups had quite comparable pretest scores initially, with averages of 12.60 and 12.20, respectively. Nonetheless, posttest findings (Table 7) indicated a significant enhancement in the experimental group, which had a mean score of 24.60 versus 16.90 in the control group. This variation was statistically significant ($p < .001$), as illustrated in Table 6, underscoring the effectiveness of the created educational resources. These results correspond with earlier studies by Jonassen and Land (2012), which suggested that materials focused on learners and competency can enhance conceptual comprehension and involvement.

Aligned with the fourth objective, both qualitative and quantitative feedback from students and teacher evaluators was collected to evaluate the usability and engagement of the materials. The assessment of students (Table 8) demonstrated a high level of consensus ($M = 4.22$, $SD = 1.05$) concerning aspects like clarity of content, structure, involvement, and assistance for learning. Teacher feedback obtained via thematic analysis (Table 9) highlighted recurring themes including accessibility, real-world connections, varied learning methods, and differentiation. These results back the claim made by Tomlinson (2014) that differentiated and pertinent teaching enhances student involvement and success.

Ultimately, the fifth goal focused on analyzing the statistical importance of performance improvements. Results from the paired t-test (Table 10) showed a notable enhancement in posttest scores for both groups, with a substantially greater effect seen in the experimental group ($t = 19.92$, $p < .001$)

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compared to the control group ($t = 9.96$, $p < .001$). This additionally verifies the greater effect of the created learning materials in improving student academic achievement. These findings support previous assertions made by Marzano and Kendall (2007) that successful teaching relies on well-defined standards, student involvement, and consistency with learning competencies.

Conclusions

This study aimed to develop and evaluate competency-based learning materials for Grade 7 Life Science aligned with the Matatag Curriculum. The conclusions drawn from the findings are organized to correspond directly with each specific research objective.

The study successfully identified the key competencies in the Grade 7 Life Science Curriculum under the Matatag Curriculum framework. This mapping process served as a strong foundation for the development of learning materials that are standards-based and competency-driven, ensuring that instruction is aligned with the intended learning outcomes and anchored in mastery learning principles.

Competency-based learning resources were developed based on the identified MELCs and validated through expert review. The materials reflected sound instructional design, using a backward design approach to ensure that each learning activity was purposeful, engaging, and aligned with desired outcomes. Expert validators confirmed the alignment, practicality, and pedagogical soundness of the materials.

The implementation of the developed learning resources among the experimental group led to significantly higher academic performance compared to the control group. Statistical analysis of the pre-test and post-test results revealed a notable improvement in the experimental group's understanding of Life Science concepts, highlighting the effectiveness of the competency-based approach in supporting deeper learning.

Quantitative analysis of performance data confirmed the impact of the developed materials on student achievement. The experimental group's gains indicate enhanced retention and engagement with scientific content. This supports the effectiveness of competency-focused instruction and affirms the value of aligning materials with both curriculum standards and evidence-based pedagogical frameworks.

Qualitative feedback from both teachers and students emphasized the usability, clarity, and motivational value of the developed materials. Teachers found the resources instructionally valid and practical for classroom use, while students appreciated their relevance and accessibility. This indicates that well-designed materials not only support content mastery but also positively influence learners' attitudes and experiences in science education.

Overall, the study provides empirical evidence supporting the Matatag Curriculum's focus on outcome-based education. It offers a practical model for translating curriculum competencies into effective instructional materials. While the findings are promising, the study also acknowledges its limitations, such as its focus on a single grade level and subject area, and recommends future research to explore broader applications, long-term effects, and use across diverse educational contexts.

Recommendations

Based on the findings and conclusions, the researcher came up with the following recommendations:

Future researchers are encouraged to replicate this study across various grade levels within the Matatag Curriculum to determine if the findings hold in different educational contexts.

Similar studies should be conducted in other subjects in the Matatag Curriculum in multiple schools to enhance the generalizability and applicability of the results.

Extending the intervention period is advised to explore the long-term impact of competency-based learning resources on students' knowledge retention and academic growth.

Consider integrating digital or blended learning formats in future implementations to examine the adaptability of competency-based resources in technology-supported classrooms.

Incorporating additional qualitative methods, such as interviews or classroom observations, is suggested to provide deeper insights into student engagement, instructional delivery, and learning experiences.

Further research should investigate the potential of competency-based learning resources in fostering higher-order thinking skills, scientific reasoning, and problem-solving abilities among students.

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