Development of Contextualized Learning Packets in Ecosystem for Grade 7 Learners

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ABSTRACT

This study aimed to develop Contextualized Learning Packets on the topics of Ecosystem, focusing on the least mastered competencies with codes S7LT-IIh-9 and S7LT-IIj-12. The needs assessment results revealed a strong demand for the creation of packets for the participating school. The packets received excellent ratings for content, format, presentation, accuracy, and up-to-date information, with an average mean score of 3.87, reflecting overall satisfaction. Additionally, learners expressed positive feedback regarding the packets, with an overall weighted mean of 3.63, indicating strong agreement with the effectiveness of the materials. Furthermore, the science teachers shared favorable perceptions of the packets, particularly regarding the appropriateness of the content, contextualization, task simplicity, and the overall attractive design and layout.

Keywords: Contextualization, ecosystem, learning packets

INTRODUCTION

The research literature from different countries shows that there is considerable worldwide commonality in the kinds of challenges and issues facing scientific education, particularly in the primary and secondary grades (Ogunkola, 2011). In the Philippines, factors such as inadequate curriculum preparation, ineffective teaching methods, poor administrative practices, and the lack of a strong science culture have been identified as contributors to low science achievement (Bernardo et al., 2008). Despite the fact that the K-12 program in the Philippines was implemented to align the curriculum with the other countries and to meet with international standards (Bermudez, 2018), aside from PISA result, Philippines also came in last out of 58 countries in mathematics and science in the 2019 Trends in International Mathematics and Science Study (TIMSS) (CNN Philippines 2020). PISA evaluates critical thinking, problem-solving, and communication skills, providing insights into how well education systems prepare students for real-world challenges.

Results from both national and international assessments have underscored the crisis in the Philippines' science education. For example, Santos et al. (2021) identified specific challenges: distinguishing biotic and abiotic components in ecosystems, predicting the impact of abiotic changes, and understanding biological organization levels. Etobro and Fabinu (2017) also noted difficulties in ecological management and resource preservation comprehension. These findings highlight the need for targeted interventions to enhance both teaching and learning processes.

The Department of Education (DepEd) in the Philippines has recognized these challenges and emphasized the need for structured remediation programs and interventions (DepEd Order No. 39, s. 2012). The Enhanced Basic Education Act of 2013 (Republic Act 10533) also stresses the importance of a curriculum that is flexible, contextualized, and globally competitive (Official Gazette, 2013). Despite these efforts, the country continues to face significant challenges in science education, such as low teacher salaries, limited professional development opportunities, overcrowded classrooms, and inadequate resources (Rogayan & Albino, 2019; Kaptan & Timurlenk, 2012). Furthermore, student disengagement, achievement gaps, language barriers, and lack of parental support exacerbate these issues, negatively impacting the quality of learning (Mtsi & Maphosa, 2016).

Learning depends on the action itself as well as the environment and culture in which it is performed (Gillespie, 2002). For this reason, a variety of instructional strategies known as Contextualized Teaching and Learning (CTL) have been developed. By concentrating teaching and learning efforts on real-world applications within a student-interested context, CTL aims to more seamlessly connect pre-requisite skill acquisition with academic or professional content (Mazzeo et al., 2008). Given the persistent challenges in science education, addressing these gaps through targeted interventions is crucial for improving educational quality and ensuring that students are better equipped for future success.

Taking these points into consideration, the purpose of this study was to develop contextualized learning packets that support both teachers and learners by being used for both teaching and remediation. According to Phoenix Union High School District AZ (n.d), a learning packet comprises a unit of study covering any topic, where students can work with some degree of independence from their teacher and from the class. In hindsight, it seems obvious that if learning was connected to known local experiences, it would benefit students more and have greater value. Undoubtedly, the teacher and the students who took part in the lesson found the usage of contextualized activities to be both relevant and beneficial.

A well-designed learning packet integrates a range of multi-sensory activities centered around performance objectives. Recognizing that students learn best through hands-on experiences, it fosters performance-based learning, offering students the opportunity to actively engage in and showcase specific skills learned through instruction. This approach enables students to not only recall information but also demonstrate their ability to apply and use the knowledge they have acquired (Fhea, 2020). This principle guided the development of the learning packets used in this study.

METHOD

This research aligns with Dr. Michael Allen's Successive Approximation Model (SAM), as outlined by Allen and Sites (2012). SAM is an instructional design approach that has proven to be more efficient and effective in teaching and learning STEM (Ali et al., 2021). In this study, SAM was used as a framework for developing and implementing the contextualized learning packets. Unlike traditional linear models, SAM emphasizes continuous evaluation and refinement of instructional materials, such as the packets, throughout the process. Developed by Dr. Michael Allen of Allen Interactions, this model consists of three key phases: Preparation, Iterative Design, and Iterative Development.

Needs Assessment Survey Interview of the Key Informants

The researcher adapted and modified a needs assessment survey questionnaire from the study of Jumawan et al. (2022) to evaluate the need for contextualizing the Learning Packets. The survey was then validated by three experts holding Master’s or Doctorate degrees in professional education. The questionnaires were distributed to the school principal and science teachers at Balo-i National High School, with separate sets of questions for each group. Their responses, along with their comments and suggestions, provided valuable input for the development of the contextualized learning packets.

Development of the Contextualized Learning Packets

The present study used the Successive Approximation Model (SAM) put forward by Dr. Michael Allen of Allen Interactions. This model is composed of the following stages: preparation, iterative design, iterative development, and rollout (Allen & Sites, 2012).

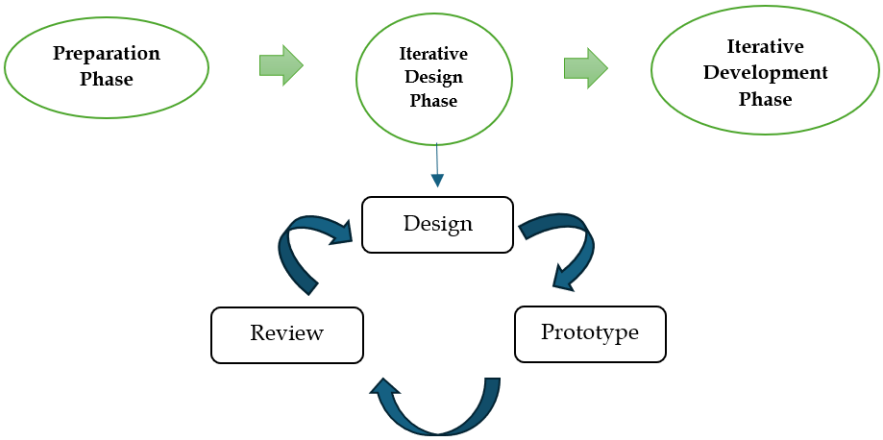

Figure 1. Successive Approximation Model (SAM) by Michael Allen (2014)

Preparation Phase

This research began with a comprehensive information gathering phase.

A. Lesson Focus

The Science Learning Module (SLM) for grade 7 and the needs assessment conducted with key informants served as valuable resources for the researcher in designing and developing the learning packets.

B. Mapping of Competency

To determine the content to be covered in the Contextualized Learning Packets, the researcher analyzed the least mastered competencies in Science 7 from the Most Essential Learning Competencies (MELCs) and the K-12 science curriculum of the Department of Education (DepEd). This analysis involved identifying learning objectives, target audience, and available resources. Furthermore, literature studies were conducted to identify relevant concepts for inclusion in the packets. Once all the necessary information was gathered, the study proceeded to the next phase, which is the developing of a prototype of the learning packets.

Iterative Design Phase

This stage has three parts:

A. Designing and Conceptualization of the Content

The lesson's design and conceptualization were guided by the content, performance standards, and learning competencies specified in the Department of Education's Most Essential Learning Competencies (MELCs). Each learning packet included five activities: two main activities, one "What Have I Learned" (generalization) activity, one "What Can I Do" (application) activity, and one "Let Us Explore More" (enrichment) activity. Additionally, each packet contained pre- and post-assessment activities with answer keys provided on the last page, enabling learners to self-assess their understanding.

B. Prototype (Alpha release feedback)

The researcher drafted a basic structure for the learning packets, which involved using illustrations to showcase the organisms in the community. The packets featured a variety of activities, including quizzes, identification

tasks, poster development, and drawing, reflecting the key informant's suggestion for a diverse learning experience. This approach aimed to integrate readings, quizzes, and hands-on activities while ensuring alignment with the Most Essential Learning Competencies (MELCs).

C. Reviews

Following the development of the contextualized learning packets, a comprehensive evaluation process was conducted. The packets underwent a first revision, where four research panels provided feedback through face validation. The evaluators' ratings, comments, and suggestions were carefully considered in refining the instruments.

Iterative Development Phase

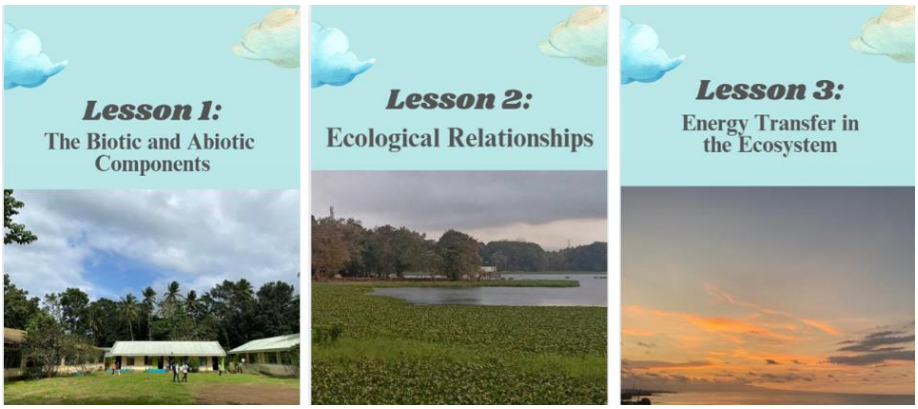

Figure 2. Cover page of the Contextualized Learning Packets

Figure 2 shows the three cover pages of the contextualized learning packets, each featuring images of the ecosystem in Balo-i, Lanao del Norte, a central focus of the study. The selection of cover photos was the only aspect that received feedback during the face content validation with the research panels and the evaluation ratings from in-service science teachers. This aligns with Harmer's (2013) assertion that pictures are among the most effective and cost-efficient visual aids. A picture can convey an entire explanation of a thing, place, or person. It not only represents the actual object in its entirety but also vividly symbolizes the subject it depicts.

Data Analysis

The following statistical tools and scaling were used by the researcher to analyze and interpret the data acquired before and after the development of the learning packets. The mean was used to analyze the ratings in the needs assessment questionnaire and the developed contextualized learning packets on the Ecosystem. The standard deviation was applied to determine the extent of data dispersion relative to the mean. In addition, a thematic analysis was used in this study to determine the teachers' perception on the use of the developed learning packets using a scale modified from Bontilao et al. (2021). This involved identifying recurring themes within the data collected from the needs assessment survey questionnaire responses.

RESULTS AND DISCUSSION

This chapter provides an analysis and interpretation of the collected data. The primary aim of this study was to create contextualized learning packets focused on ecosystems for Grade 7 learners at Balo-i National High School.

Summary of the Results from the Needs Assessment Interviews with Key Informants

The results from the needs assessment interviews were pivotal in developing the learning packets on ecosystems. Respondents included the school principal and four (4) in-service science teachers from Balo-i

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National High School, located in Achacoso Drive in Ma. Cristina, Balo-i, Lanao del Norte. These key informants voluntarily participated and signed consent forms provided by the researcher. Tables 1,2, and 3 present an overview of the key informants' responses, organized into three categories: (1) teaching experience and issues/ problems encountered by teachers, (2) contextualization and localization of the content, and (3) familiarity with the learning packets.

Table 1. Summary of Key Informants' Feedback on Efforts to Address Challenges in Teaching Ecosystems

Themes	Category	Sample Responses
Teaching Experience	Years of teaching experience	15 years **(NA-SP)** 14 years **(NA-ST2 and NA-ST3)** 20 years **(NA-ST1)** 8 years **(NA-ST5)** 5 years **(NA-ST4)**
Issues encountered in teaching ecosystems	Difficult competencies	**NA-ST 1,3, and 4:** Describe the different ecological relationships found in an ecosystem (S7LT -IIh – 10) **NA-ST 2 and 5:** Predict the effect of changes in abiotic factors on the ecosystem (S7LT -IIj – 12)
	Inadequate learning resources	**NA-SP: "**Inadequate resources and facilities." **NA-ST3:** "There are few learning resources available such as learner/teacher manual that can be used during discussion".
	Time/ Duration	**NA-ST1:** "This topic is mostly not covered because the competencies are at the end of the quarter" **NA-ST5:** "Disruption of classes as the reason for these topics not to be discussed thoroughly."
	Limitation within the classroom	**NA-SP:** "Discussions are limited inside the classroom." **NA-ST2:** "Difficulty in transferring knowledge if learning is conducted inside the classroom only."
	Interventions to address the issues	**NA-ST3:** "I searched for additional learning resources from the internet" **NA-ST4 and NA-ST5:** "Providing modules and handouts if there is disruption of classes. **NA-SP:** "Encouraging teachers to let learners explore their immediate surrounding such as the school and their homes" **NA-ST1:** "I tried to increase outdoor activities of learners."

Table 1 presents the themes related to teaching experiences, the challenges teachers encounter when teaching ecosystems, and the interventions they have applied to address these challenges. The data reveals that all the in-service teachers have between 5 and 20 years of experience, indicating that they have likely developed a solid understanding of both ecosystems and student engagement. This experience makes them valuable contributors to the study. Their familiarity with various classroom dynamics allows them to assess and implement new teaching strategies more effectively. This is consistent with research indicating that, although teachers experience the most rapid growth in the early years of their careers, they continue to develop throughout their careers, albeit at a slower rate (Kini & Podolsky, 2016).

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The results show that among the challenges faced by teachers, three (3) science teachers expressed difficulty in teaching the competency with code "S7LT -IIh – 10" while two (2) teachers reported difficulty in teaching the competency with code "S7LT-IIj – 12". This aligns with the article's observation that many students approach ecology courses with a simplified view, seeing them as merely a matter of memorizing facts about biomes and species. This perspective can create resistance to learning more complex concepts and hinder their ability to appreciate the dynamic, interconnected nature of ecosystems, as well as grasp even basic ideas (Small Pond Science, 2013). In addition, Santos et al. (2021) found that the lowest scores were recorded in the following competencies: predicting the impact of changes in abiotic factors on ecosystems, distinguishing between biotic and abiotic components of an ecosystem, and describing the various levels of biological organization, from the cell to the biosphere.

Unfortunately, even today, shortages in equipment, facilities, and other learning resources continue to hinder teachers from delivering quality education, as also posed by NA-SP and NA-ST3 in their responses under the problems encountered. Sadera et al. (2020) found that the most significant barrier to junior high school learners' science learning is the lack of instructional materials. Mtsi and Maphosa (2016) also highlighted that the absence of proper facilities and funding for science education creates a range of interconnected challenges. Based on feedbacks from the key informants, it is evident that there is a pressing need to develop learning materials that can better support both teachers and students in the teaching and learning process.

Furthermore, two respondents (NA-SP and NA-ST2) reported facing challenges in teaching ecosystem topics when confined solely to the classroom environment. As noted by Anter and Bulonos (2022), the role of educators extends beyond merely imparting knowledge within the classroom; they also play a crucial part in transforming the lives of individuals within the communities where they live. Therefore, teachers require support to enhance their teaching strategies and deliver high-quality instruction to learners.

The responses from the key informants align with the findings of Bernardo et al. (2018), which identify factors such as inadequate curriculum preparation, ineffective teaching methods, poor administrative practices, and the absence of a strong science culture as contributors to low science achievement. The needs assessment summary suggests that the issues faced by the participating school are similar to those experienced by teachers in other parts of the country.

Table 2. Summary of Key Informants' Responses on the Contextualization and Localization of the Topic Ecosystems

Themes	Category	Sample Responses
Contextualization and localization of the content	Familiarity of contextualization and localization of lessons and activities	**NA-SP:** "Yes, I am familiar with contextualization and localization." **NA-ST 1,2,3,4, and 5:** "Yes, we are familiar with both the contextualization and localization."
	Attended training and seminars	**NA-SP:** "Yes, I had the opportunity to attend seminars on the contextualization and localization of lessons, and I know they help teachers become more creative in delivering their lessons." **NA-ST 1,2,3,4, and 5:** We have attended school-based seminar about contextualization and localization, but rarely contextualize lessons due various reasons."
	Conducted training and seminars	**NA-SP:** "I was not able to conduct seminars on contextualization and localization of lessons." **NA-ST 1,2,3, and 5:** "We did not conduct a seminar about contextualization and localization."

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	Benefits of Contextualization in the Teaching and Learning Process	**NA-ST4:** "I was able to re-echo the seminar workshop I attended about contextualization and localization." **NA-SP:** "Through this approach, learners will be able to fully understand the concepts, and over time, they will be able to transfer that knowledge to real-world scenarios." **NA-ST1 and NA-ST3:** "Learning will be more meaningful since learners can relate to it." **NA-ST4:** "There will be easier application as learners will/ have already experienced the concepts in the locality." **NA-ST2 and NA-ST5:** "This provides easier transfer of knowledge."

Table 2 presents the theme of contextualization and localization of content, based on the responses from the key informants. Regarding familiarity with contextualized teaching, all key informants were acquainted with this approach. This familiarity stems from its introduction by the Department of Education through a seminar attended by the respondents.

According to the Department of Education (2016), contextualization involves integrating relevant and meaningful elements into the creation and development of instructional materials to make learning more connected to students' lives and experiences. It is a strategy designed to engage students and help them relate their personal experiences to the subject matter being taught. However, the effectiveness of contextualization and localization depends on the topic, as it must link the content to real-life situations and cultural contexts. Additionally, teachers face challenges such as making lessons engaging and preparing self-directed activities.

As for the key informants' attendance to seminars and trainings, all of them have attended, but stated that they rarely contextualize lessons because of various reasons such as time constraints and suitability of topics as stated by NA-ST 1 and NA-ST3, respectively. This is consistent with the study of Svinicki (2004), which highlights that contextualization requires adequate time, preparation, and exposure to fully comprehend the issues involved. Additionally, science teachers face challenges in delivering lessons that are both engaging and relevant to students' lives, while also connecting the content to their community or locality. Incorporating local culture as a key element of the curriculum is essential, as it can significantly enhance students' knowledge, skills, and attitudes toward their studies (Ayaton et al., 2023).

Finally, the key informants recognized contextualization as a crucial factor in creating a meaningful learning experience. Both the school principal and the five science teachers saw contextualization as advantageous in the teaching and learning process. Gecolea and Amon (2022) concluded that the use of contextualized activities was undeniably relevant and beneficial for both instructors and students participating in the class. Contextualized learning materials are especially advantageous for students because they use familiar examples, which make the content easier to understand and motivate students to engage with the topic. Similarly, this approach benefits teachers by emphasizing their role as facilitators of learning, rather than merely transmitters of knowledge. In summary, the findings reinforce the importance of developing contextualized learning materials to help learners better understand the lessons.

Table 3. Summary of Key Informants' Responses on Learning Packets

Themes	Category	Sample Responses
Familiarity of the learning packets	Insights	**NA-SP:** "Learning packets are instructional materials that can be used by the learners for independent learning just like the learning modules."

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	Attended and conducted seminars and training	**NA-ST1,2, and 5:** "Contains lessons and contents used for teaching and learning". **NA-ST3 and NA-ST4: "**Just heard of the term learning packets." **NA-SP, NA-ST1,2,3,4, AND 5:** "No seminars and trainings attended and conducted." **NA-ST1:** "It would be useful as it can be an additional learning resource where learners can learn meaningful ideas as they can relate to it."
	Benefits of the learning packets in teaching the topic in Ecosystems	**NA-ST2 and NA-ST5:** "These will be useful in teaching the topic ecosystems as it can be used in independent learning especially that this topic is in the last part of the quarter."
	Comments and Suggestions	**NA-SP:** "Ensure that the contents of the packets are aligned with the MELCs provided by the DepEd, and activities are appropriate to the target learners."

Table 3 presents the theme regarding the familiarity with learning packets. According to the responses, two out of six key informants encountered the term "learning packets" for the first time. Although the other four had heard of it before, no one had attended or conducted any training or seminars specifically about learning packets. Despite this lack of direct experience, all the informants described learning packets as instructional materials that can be utilized by students in the teaching and learning process. Even without in-depth knowledge of the packets, three key informants expressed the belief that learning packets would be beneficial, particularly for teaching topics related to ecosystems and promoting independent learning.

Learning packets are instructional materials that include lessons based on the Most Essential Learning Competencies (MELCs) (Navarro et al., 2023). Canaria (2022) stated that these typically focus on a smaller, more specific set of instructions aimed at targeted lessons. They can be used independently by learners and often contain exercises, readings, and a variety of activities. The development of contextualized learning packets was intended to engage students by offering self-learning activities that foster 21st-century skills, while also aligning with the standards and educational goals set by the Department of Education.

To this time, there is a growing need for additional learning resources, such as learning packets, to address the challenges teachers face in delivering high-quality education (Allonar et al., 2024). In this regard, the NA-SP recommended that when developing and using learning packets, it is essential to ensure that the content aligns with the MELCs provided by the Department of Education (DepEd), and that the activities are suitable for the target learners.

While the key informants are generally familiar with learning packets, not all of them possess the expertise needed for their proper implementation and effective use in the classroom. The World Bank (2014) highlights that systems at the school level to support teachers and identify their professional development needs are often inadequate. Many teachers are unable to attend training seminars or professional development activities, primarily because their teaching responsibilities demand their constant presence in the classroom, often leaving little time for personal growth or the enhancement of instructional practices. For teachers to fully leverage the developed teaching and learning materials, they must participate in professional development programs, such as workshops, seminars, and training sessions, which will help improve their instructional

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skills and the effective utilization of these materials. According to Van Der Schaaf et al. (2019), achieving high educational standards in the new norma requires teachers to actively engage in professional development activities while simultaneously strengthening their core competencies to boost overall teaching effectiveness and student outcomes.

Selection of Learning Competencies from DepEd MELCs

The DepEd MELCs and the DAT results provided the foundation for creating the learning packets, as they specify the key competencies, knowledge, and skills that grade 7 students are expected to master. This focus ensures that the materials emphasize the most crucial concepts and skills necessary for learners to develop during the crisis (De Guzman, 2022). Additionally, the MELCs ensure that the lessons in the packets are suitable and aligned with the learners' grade level, performance standards, and content requirements.

Table 4. Selection of Topics in DepEd's Most Essential Learning Competencies (MELCs) for the 2nd Quarter

Content Standard The learners demonstrate understanding of…	**Performance Standard** The learners should be able to…	**Most Essential Learning Competencies**	**Duration**	**K to 12 CG Code**
Organisms interacting with each other and with their environment to survive	employ appropriate techniques using the compound microscope to gather data about very small objects	Differentiate biotic from abiotic components of an ecosystem	Week 6	S7LT-IIh-9
		Describe the different ecological relationships found in an ecosystem	Week 7	S7LT-IIj-10

Table 4 outlines the content standards, performance standards, learning competencies, duration, and K to 12 curriculum guide codes utilized in the study. The focus was on two specific learning competencies: (1) "differentiate biotic from abiotic components of an ecosystem" (code S7LT-Iih-9) and (2) "describe the different ecological relationships found in an ecosystem" (code S7LT-IIj-12). These competencies were selected because they were identified as the least mastered by Grade 7 learners according to the Division Achievement Test according to the participating school and needs assessment responses of the science teachers.

Environmental issues are among the most pressing challenges today, often driven by unconscious behaviors, negative attitudes, and ignorance toward the environment. It is essential for students to understand ecosystem processes and the impact of external influences on conservation, especially given future ecological challenges. Due to their complexity, learning about ecosystems is often approached through systems thinking. However, challenges also arise in applying knowledge and addressing misconceptions. The United Nations (2015) introduced the Agenda for Sustainable Development to address these issues, highlighting the importance of understanding ecological topics like biodiversity loss. These concepts are integrated into primary and advanced curricula worldwide (Australian Curriculum, Assessment and Reporting Authority, 2017; National Research Council, 2013).

Students are taught to recognize ecosystems, analyze their behavior, and understand their preservation. International science standards emphasize examining the interaction between biotic and abiotic components in ecosystems, using a systems thinking approach (Australian Curriculum, Assessment and Reporting Authority 2017). Since these competencies are introduced at the end of the second quarter in Grade 7, teachers are often unable to discuss them in depth before the academic term ends.

Validation of the developed learning packets in Ecosystem by the In-Service Science Teachers

The following are the ratings provided by in-service science teachers with Master's or PhD degrees. The evaluators used the standardized evaluation-rating sheet developed by the Department of Education (DepEd, 2015) to assess whether the materials were suitable for use in classrooms and public schools.

Table 5. Evaluator's Rating of the Developed Contextualized Learning Packets in Ecosystem

Components	**Average Mean**	**Interpretation**
Content	3.82	Very Satisfactory
Format	3.80	Very Satisfactory
Presentation and Organization	3.92	Very Satisfactory
Accuracy and Up-to-datedness of information	3.94	Very Satisfactory
Overall Average Mean	3.87	Very Satisfactory

Note: 4.00-3.25 : Very Satisfactory
2.49-1.75 : Not Satisfactory
3.24-2.50 : Satisfactory
1.74-1.00 : Poor

Table 5 provides a summary of the ratings given by five in-service science teachers using the standardized rubric from the Department of Education (DepEd). The contextualized learning packets developed received very satisfactory ratings across all areas, with an overall average score of 3.87. This suggests that the learning material is of high quality in terms of content, format, presentation, organization, accuracy, and relevance.

This aligns with the findings of Domato et al. (2024), which state that the developed localized learning material is highly regarded for its content, applicability, clarity, and accuracy. As a result, the learning packets proved effective in improving student performance. Similarly, Ballesteros (2019) emphasized that the K-12 Basic Education Program highlighted the use of localization and contextualization as an innovative approach in Science education.

CONCLUSION

The needs assessment conducted with the school principal and science teachers identified several challenges in teaching the topic of Ecosystems. While both the principal and teachers were familiar with contextualizing activities, not all had participated in seminars or training related to this approach. The assessment clearly indicated the necessity for developing contextualized learning packets to address these challenges. Furthermore, the five in-service science teachers from Balo-i National High School unanimously agreed that two specific competencies from the science MELCs (S7LT-IIh-9 and S7LT-IIj-10) posed significant teaching difficulties.

In terms of validating the learning packets, the evaluation panel awarded an average mean score of 3.87 (Very Satisfactory), based on criteria such as format, presentation, and the relevance of the information. This high rating underscores the quality and effectiveness of the learning packets, affirming their value as a vital tool for this study. The packets were found to be engaging, enjoyable, and interesting, fostering a positive learning environment. These qualities enabled learners to connect their personal experiences with the lessons and activities, enriching their understanding and deepening their overall learning experience.

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