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DEVELOPMENT AND VALIDATION OF LESSON EXEMPLARS FOR TEACHING BIOLOGY 11

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ABSTRACT

This study developed and validated a Lesson Exemplar Package on Teaching Plant and Animal Tissues for Grade 11 Biology under the MATATAG Curriculum. Specifically, it identified the essential requisites in developing the lesson exemplar, described its development using the ADDIE instructional design model, determined its level of validity, examined the observations and feedback of expert validators, and identified the revisions made based on their comments and suggestions.

A descriptive-developmental research design was employed. The study was conducted at Cabadbaran National High School and involved Biology teachers from public and selected private schools as respondents, while Master Teachers and a Subject Program Supervisor served as expert validators. Data were gathered using a semi-structured interview guide and the standardized Department of Education Learning Resource Management and Development System (LRMDS) validation checklist. Mean and thematic analysis were utilized to analyze the quantitative and qualitative data.

Findings revealed that the development of the lesson exemplar required inquiry-based, contextualized, multimedia-supported, and learner-centered instructional strategies. Guided by the ADDIE model, the lesson exemplar underwent systematic development, validation, revision, and revalidation. Initial evaluation identified inaccuracies in the information presented; however, after incorporating the validators' recommendations, the revised lesson exemplar obtained very satisfactory ratings in content, format, presentation and organization, and accuracy and up-to-datedness of information. Expert validators described the material as organized, engaging, and appropriate for Grade 11 learners. Revisions further enhanced its instructional quality through improved content accuracy, clarity, visual presentation, and the inclusion of a teacher's guide.

The study concluded that the ADDIE instructional design model provided an effective framework for developing high-quality instructional materials. The validated lesson exemplar was found to be classroom-ready and suitable for Grade 11 Biology instruction under the MATATAG Curriculum.

KEYWORDS: Lesson Exemplar, Biology Instruction, ADDIE Model, Instructional Material Validation, MATATAG Curriculum.

INTRODUCTION

Biology lessons have been shifting toward learner-centered approaches, such as inquiry-based learning and meaningful experiences. The international education frameworks highlight the need to create instructional materials to increase student engagement and to develop scientific literacy (Chikaluma et al., 2022). The findings of research conducted in various countries, such as Finland, Singapore, and the United States, support the importance of providing students with opportunities to connect what they have learned in the classroom to the real world through well-developed lesson materials focused on environmental conservation, agricultural practices, and human health. Therefore, globally, high-quality lesson exemplars are viewed as valuable resources for improving science education and providing greater relevance for diverse learners (Niles, 2025).

In the Philippines, by supporting teacher-initiated instructional techniques, the Department of Education (DepEd) is working to provide teachers with the resources they need to develop engaging materials that align with the K-12 Curriculum Framework, helping produce scientifically competent students capable of responding to the needs of today's society. Developing lesson exemplars for Biology has the potential to help students visualize scientific vocabulary and microscopic processes without being explicitly taught how to do so by means of teacher-supported lesson exemplars (Montero & Geducos, 2022); therefore, providing an opportunity for teachers to personally see the value of Biology and gain an understanding of it.

This study is also aligned with United Nations Sustainable Development Goal 4 (Quality of Education), the goal of providing inclusive, equitable, and quality education while ensuring opportunities for lifelong learning for all. A validated and learner-centered lesson exemplar provides a way to improve the quality of Biology instruction, enhance scientific literacy, and help students understand complex biological concepts through experiential learning.

Moreover, this promotes research on effective teaching practices and curriculum-based instructional innovation to provide quality Science Education at the secondary school level.

Due to the requirements of the Enhanced Basic Education Act of 2013 (Republic Act No. 10533), which mandates the continuous development of new learning materials that address the country's evolving educational needs, the Department of Education (DepEd) has incorporated teacher-generated learning materials as part of its permanent instructional strategy, under DepEd Order No. 35, s. In 2016, lesson exemplars will be considered fundamental instructional tools for classroom delivery, as reinforced by DepEd Order No. 21, s. 2019, which directs the development of quality instructional materials to enhance student performance. The MATATAG Curriculum places greater emphasis on creating validated learner-centered instructional resources to ensure that competencies are mastered. DepEd policies encourage instructional methods and strategies that include innovative practices and non-traditional formats (e.g., lecture-based), providing guidelines for incorporating expert review and facilitating greater flexibility and effectiveness in teaching and learning.

As a pilot school using the MATATAG Curriculum, the Cabadbaran National High School does not have a validated lesson exemplar for Grade 11 Biology on animal and plant tissues. Consequently, several instructional barriers exist for the school's Biology teachers, such as limited laboratory space, limited lab equipment (e.g., only a few microscopes), and non-standardized lesson guides for this type of instruction. As a result, the lessons are typically theoretical, providing very few opportunities for students to visualize tissue structures or understand their roles/functions in biological systems. Additionally, these conditions do not allow students to relate tissue organization to real-life processes. According to Navarro et al. (2024), the lack of standardization and high-quality lesson exemplar guides leads students to memorize only definitions rather than truly understand the structure and function of tissues.

The study addressed a contextual research gap and validated the implementation of the MATATAG Curriculum at Cabadbaran National High School. Although the Department of Education has strongly recommended the use of quality-assured, learner-centered instructional materials, the school had no locally developed or expert-validated lesson exemplar for Grade 11 plant and animal tissues in Biology. Therefore, the lack of standardization and expert-validated instructional materials results in unreliable and inconsistent classroom instruction, as well as limited inquiry-based and learner-centered teaching methods. The current study proposes to address these issues through the systematic development and expert validation of a lesson exemplar.

Even though various national initiatives promoting contextualized and quality-assured learning resources have been established, there remain clear gaps in contextual research and validation in schools. The Cabadbaran National High School does not have any locally developed or expert-validated lesson exemplar for plant and animal tissues in Grade 11 Biology 2, third quarter, in the MATATAG curriculum. As a result of those two factors, there was unreliable and inconsistent classroom instruction and limited use of learner-centered instructional approaches, thus necessitating the systematic development and expert validation of a lesson exemplar to create an instructional guide aligned with the MATATAG Standards.

Based upon these problems, this study developed and validated a lesson exemplar for teaching plant and animal tissues in Grade 11 Biology. The researcher employed the Constructivist Learning Theory and the ADDIE instructional design methodology to develop a high-quality, curriculum-based instructional guide for Biology teachers. The study provided an expert-validated lesson exemplar that enhanced students' understanding of complex biological concepts through student-centered learning.

1.1 Statement of the Problem

This study developed and validated a lesson exemplar for teaching plant and animal tissues in Grade 11 Biology 2, Third Quarter, of the Matatag Curriculum during the School Year 2025–2026 at Cabadbaran National High School.

Specifically, this study sought to answer the following questions:

1. What are the essential requisites in the development of the lesson exemplar for Biology 2, Third Quarter?
2. How was the lesson exemplar developed following the ADDIE instructional design model?
3. What is the level of validity of the lesson exemplar as evaluated by expert validators in terms of:
   - 3.1 content;
   - 3.2 format;
   - 3.3 presentation and organization; and
   - 3.4 accuracy and up-to-datedness of information?
4. What are the observations and feedback of the expert validators regarding the strengths and areas for improvement of the lesson exemplar?

5. What revisions can be made to improve the lesson exemplar based on validation results?

2. METHODOLOGY

2.1 Research Design

This study employed a descriptive-developmental research design that focused on the systematic design, development, and evaluation of a lesson exemplar for teaching both plant and animal tissues. The design involved analyzing existing learning competencies and instructional needs, developing the lesson exemplar based on these findings, and validating its quality through expert evaluation. Unlike traditional experimental designs, this study focused on the technical and pedagogical soundness of the material, as assessed by subject-matter experts and practitioners. This design was suitable because it enabled the study to document the development process, assess the exemplar's effectiveness, and provide evidence-based insights to improve instructional materials and Biology teaching practices. Moreover, the descriptive-developmental design was appropriate because the primary objective of the study was not to test cause-and-effect relationships but rather to focus on the systematic development, validation, and refinement of instructional material to meet existing educational standards.

This study focused on the development, validation, revision, and finalization of a lesson exemplar package for Biology 11. The research design was appropriate because it systematically documented the processes for developing instructional materials and for determining their validity and acceptability through expert evaluation.

2.2 Research Locale

The study was conducted at Cabadbaran National High School and selected private schools in Cabadbaran City, Agusan del Norte. These schools offer secondary education programs, including the Science, Technology, Engineering, and Mathematics (STEM) strand. Since these institutions implement the K to 12 and MATATAG Curriculum in Biology instruction, they served as appropriate settings for the development and validation of the lesson exemplar.

2.3 Research Participants/Sampling

The study's respondents consisted of six Senior High School Biology teachers from Cabadbaran City, Agusan del Norte, comprising three from public schools and three from private schools. These teachers participated in the focus group discussion and provided inputs regarding the development of the lesson exemplar package. They were chosen because they offered suggestions, feedback, and insights relevant to the development of the Biology 2 lesson exemplar during the Focus Group Discussion (FGD). Their classroom experiences and instructional practices helped identify the essential requisites and appropriate strategies for the instructional material.

The study's validators consisted of Master Teachers and the Education Program Supervisor (EPS) in Science, who held advanced academic qualifications and extensive professional experience in science education. Their expertise in curriculum implementation, instructional supervision, and instructional material evaluation qualified them to assess the quality and validity of the lesson exemplar package. They evaluated the material using the DepEd Learning Resources Management and Development System (LRMDS) Evaluation Tool in terms of content, format, presentation and organization, and the accuracy and up-to-datedness of the information.

To ensure the credibility, objectivity, and integrity of the evaluation process, the validators independently assessed the lesson exemplars using the standardized DepEd Learning Resources Management and Development System (LRMDS) Evaluation Tool for Printed Materials. The use of a standardized evaluation instrument provided uniform criteria for assessing the quality of the instructional materials and minimized subjectivity in the evaluation process. The validators were encouraged to provide honest comments, recommendations, and ratings based solely on the merits of the lesson exemplars. In addition, the conduct of two rounds of evaluation, consisting of an initial validation and a revalidation after revisions were made, helped ensure that the final evaluation results were based on the quality of the revised instructional materials, thereby strengthening the validity and reliability of the findings.

Table 1: ***Distribution of Respondents.***

Category	**Number of Teachers**	**Percentage (%)**
SHS Biology Teachers (Public School)	3	50%
SHS Biology Teachers (Private School)	3	50%
Total	**6**	**100%**

2.4 Research Instruments

The following instruments were utilized to develop and validate the Lesson Exemplar. The first instrument was a semi-structured interview guide designed for Biology teachers to identify the requirements, pedagogical challenges, and instructional support needed to develop the lesson exemplar package. The qualitative data gathered from the interviews served as the primary basis for the study's design and development phase.

The study utilized the Department of Education Learning Resources Management and Development System (LRMDS) Evaluation Tool for Printed Materials to evaluate the developed lesson exemplars. The evaluation focused on four dimensions: content, format, presentation and organization, and accuracy and up-to-datedness of information. These evaluation criteria were adopted because they assess the instructional quality, technical accuracy, usability, and curriculum alignment of learning resources. Furthermore, the four dimensions provide a comprehensive basis for determining whether the lesson exemplars meet established standards for instructional materials and are suitable for classroom use. This standardized checklist was administered to identified expert validators during the validation process to ensure that both the assessment instrument and the lesson exemplar met DepEd standards for quality, clarity, and instructional effectiveness. In addition, the checklist included a section for qualitative feedback and recommendations, allowing the experts to provide descriptive comments and suggestions for improvement. The use of this instrument ensured alignment with national standards for printed learning resources and strengthened the credibility of the validation process.

Mean Range	Interpretation
3.50–4.00	Very Satisfactory
2.50–3.49	Satisfactory
1.50–2.49	Poor
1.00–1.49	Not Satisfactory

2.5 Statistical Treatment

The following statistical tools were utilized in the study:

Mean. This statistical tool was used to summarize the expert ratings and feedback regarding the content, presentation and format, organization, accuracy, and up-to-datedness of the instructional material presented in the lesson exemplar. The mean indicated the acceptability and validity of the lesson exemplar, based on expert evaluators' assessments before its final validation and classroom use.

Thematic Analysis. This was used in the study to analyze and interpret qualitative responses gathered from focus group discussions and expert validators' observations regarding the development of the lesson exemplar for teaching plant and animal tissues in Grade 11 Biology. The researcher carefully reviewed, coded, and grouped similar responses into themes, including inquiry-based teaching approaches, the use of multimedia materials, hands-on activities, ICT integration, contextualized learning, and classroom limitations. These themes were interpreted and discussed to explain the essential requisites, strengths, and areas for improvement of the lesson exemplar based on the responses and observations of the participants and expert validators.

3. RESULTS AND DISCUSSION

Problem 1. What are the essential requirements for developing the lesson exemplar for Biology 2, third quarter?

Instructional resources must always offer organized, purposeful experiences that lead students to succeed through well-defined goals and measures of achievement (Gagné, 1985). Kemp emphasizes the importance of teaching students systematically when developing lessons (Kemp, 1998). According to Kemp, all lessons should be organized around students' needs, establish goals for desired outcomes before creating lessons, and incorporate effective teaching methods that align with how students learn. Dick and Carey (2005) explain that instructional resources need to align with the most up-to-date curriculum standards and have appropriate teaching methodologies and evaluation techniques.

Experiential learning through inquiry promotes deeper learning not only about science but also for children in general (Schwab 1962). According to Bloom's taxonomy (Bloom 1956), all students should learn through the use of knowledge; develop cognitive processes; and develop a positive attitude toward learning about their world in order to have the necessary tools to succeed academically.

Each biology lesson exemplar developed as part of the course for Quarter 3 Biology must contain seven core elements: curricular goals established, clearly defined instructional objectives, accurate information provided in a meaningful way that connects with students and encourages them to engage with material and to understand its significance and application to their lives, methodology used to instruct students that promotes retention and transfer of knowledge, appropriate assessment procedures for all students, and lessons developed using logical sequencing.

To improve the lesson exemplar, feedback and suggestions were solicited from Biology teachers. The feedback collected from these teachers helped identify the instructional modifications that may be needed to develop the lesson exemplar. Teacher respondents provided data summarized in the table below to help improve the lesson exemplar by identifying the essential requisites from the themes generated in all teacher respondents' responses.

Table 3 presents the emerging themes on the essential requisites in the development of the Biology 2 lesson exemplar.

Table 3: ***Emerging Themes on the Essential Requisites in the Development of the Biology 2 Lesson Exemplar.***

Code	Themes	Verbatim Responses	English Translation	Interpretation
P1, P3, P4, P6	Comparative and Inquiry-Based Teaching Approach	"Mas nindot itudlo ang plant and animal tissue through comparative inquiry kaysa puro ra memorization." "Mas effective kung ang lesson sa plant ug animal tissues gamitan ug visual ug comparative approaches." "Importante gyud ang comparative approach aron makita sa mga studyante ang kalainan sa structures sa plant ug animal tissues." "Mas maayo i-compare gyud ang plant ug animal tissues."	"Teaching plant and animal tissues via comparative methods is superior to teaching through rote memory." "Visual aids complement the lesson on plant and animal tissue and make the lesson more effective." "The comparative approach is very important so students can see the differences between plant and animal tissue structures." "It is better to compare plant and animal tissues."	The results of the study show that students have a better understanding of Biology lessons when teachers use a comparative approach or an inquiry-based style, rather than rote memorization. In addition, students learn better when they use visual and comparative activities to identify similarities and differences among plant and animal tissues than when they memorize facts about them.
P2,	Use of Visual	"Mas maayo pud	"It is also better to	Responses indicate

P3, P4, P5	and Multimedia Instructional Materials	nga gamitan ug diagrams, videos, ug actual plant samples." "Mas makasabot ang mga estudyante kung gamitan og diagrams, microscope images ug videos." "Limited laboratory equipment mao need mag-prepare ug alternative resources like visual aids." "Gamit ug videos, contextualized activities ug i-relate sa real-life situations."	use diagrams, videos, and actual plant samples." "Students understand better when diagrams, microscope images, and videos are used." "Laboratory equipment is limited; there is a need to prepare alternative resources such as visual aids." "Use videos, contextualized activities, and relate them to real-life situations."	that visual and multimedia materials positively impact students' ability to comprehend Biology content more quickly and more completely. Materials such as diagrams, videos, microscope images, and actual plants create a much more engaging and meaningful way for students to learn. Teachers highlighted that using alternative visual materials and interactive real-world experiences will greatly benefit students when laboratory equipment is not readily available.
P1, P2, P3, P5	Hands-on and Laboratory-Based Learning Activities	"Mas maayo nga magconduct ug simple laboratory activities like pag-observe sa onion cells o leaf samples gamit ang microscope." "Ang mga hands-on activities, sama sa pag-observe sa tissues gamit ang microscope, makatabang gyud." "Nindot nay microscope observation activity sa plant ug animal tissues." "Need ug varied activities, interactive ug hands-on activities."	"It is better to conduct simple laboratory activities such as observing onion cells or leaf samples using a microscope." "Hands-on activities such as observing tissues using a microscope are really helpful." "Microscope observation activities for plant and animal tissues are good." "There is a need for varied,	The findings show that most teachers believe students benefit from hands-on learning and can interact with the material as they learn Biology. Simple labs can increase student participation and help students understand and engage with the lesson. Most teachers feel that having numerous interactive labs is the best way to help students feel good about the learning experience and its relevance to them down the road.

			interactive, and hands-on activities."	
P2, P3 P4, P5	Integration of ICT and Digital Resources	"Pwede pud gamiton ang phone cameras pinaagi sa microscope eyepiece aron ma-document ug ma-label sa mga estudyante ang ilang sariling observations digitally." "Pwede usab gamiton ang virtual simulations o pre-recorded videos." "Nindot gamiton ang ICT integration ug hands-on activities." "Gamit ang apps pareha sa Kahoot, quizzes aron mas ma-relate sa mga students ang lesson."	"Phone cameras may also be used through the microscope eyepiece so students can document and label their own observations digitally." "Virtual simulations or pre-recorded videos may also be used." "ICT integration and hands-on activities are good to use." "Use apps like Kahoot and quizzes so students can better relate to the lesson."	The responses suggest that integrating ICT and digital resources can make Biology lessons more interactive, engaging, and accessible for students. Teachers believe that tools such as phone cameras, virtual simulations, videos, and educational apps help students participate more actively and better understand the lesson through digital and hands-on learning experiences.
P1, P2, P4, P5	Addressing Learning Difficulties and Misconceptions	"Kasagaran sa mga learners malibog gyud sa function sa xylem ug phloem." "Lisod pud para nila hinumdoman ang mga scientific terms sama sa epithelial tissue ug meristem." "Kasagaran maglibog ang mga bata sa hierarchical organization." "Daghang estudyante ang	"Most learners are confused about the functions of xylem and phloem." "They also find it difficult to remember scientific terms such as epithelial tissue and meristem." "Students are usually confused about hierarchical organization." "Many students	Students often find it difficult to understand biological concepts, such as how cells and tissues are classified, remember scientific terms, and understand how cells operate and how they are logically organized. Because of this, we know that students require concrete explanations, teacher-guided, hands-on activities, and effective teaching strategies to develop a deeper understanding of the subject matter.

		maglisud ug identify sa cells ug tissues."	have difficulty identifying cells and tissues."	
P1, P2, P3, P6	Need for Resource-Friendly and Flexible Lesson Design	"Kulang sa laboratory equipment ug chemicals, ug kulang sa ubang learning resources." "Ang lesson exemplar adunay mga alternative strategies, sama sa paggamit og digital microscope images, videos, o printed diagrams." "Ang lesson exemplar kinahanglan student-centered, flexible, ug resource-friendly." "Lack of laboratory equipment ug learning resources."	"There is a lack of laboratory equipment, chemicals, and other learning resources." "The lesson exemplar should contain alternative strategies such as the use of digital microscope images, videos, or printed diagrams." "The lesson exemplar should be student-centered, flexible, and resource-friendly." "There is a lack of laboratory equipment and learning resources."	The findings reveal the importance of developing flexible, resource-efficient lessons that can support effective learning despite limited materials and equipment.
P3, P4, P5, P6	Contextualized and Real-Life Learning Experiences	"I-integrate ang real-life applications aron makita sa mga estudyante ang kahalagahan sa tissues." "Akong ma suggest ang paggamit sa Contextualized-Based Learning." "I-relate sa real-life situations." "Apilan ug mga contextualized nga activities."	"Real-life applications should be integrated so students can see the importance of tissues." "I suggest the use of Contextualized-Based Learning." "Connect lessons to real-world examples." "Include contextualized activities."	Teachers feel that if lessons relate to what students encounter in everyday life, the subject will have meaning and relevance for learning.

This research supported both instructional methods as appropriate ways to teach about plant & animal tissue. The participants felt that students would learn better because they will learn more about the different types of plants and animals by comparing their structure/function rather than just memorizing science terms related to those tissues. Inquiry-based learning also offered many opportunities to develop critical thinking skills and to engage more actively in classroom discussions and activities. It would appear from the participants' comments that both inquiry-based and experience-based learning produced higher levels of engagement and increased students' understanding of biological principles. These findings support Bruner's (1966) claim that students can construct their own knowledge through inquiry or discovery by seeking and comparing different ideas.

A significant number of participants of the questionnaire identified their use of visual and multimedia resources as helpful in their classroom experiences. Many students use a wide range of visual and multimedia resources (e.g., images, videos, photomicrographs, etc.) to better understand the microscopic structure and abstract concepts of plants. In addition to this, most respondents in the survey indicated that they found that the use of multimedia resources had a positive impact on the level of engagement and interest in the class discussion segment. In conclusion, this survey supports the idea that both media and visual aids enhance student understanding and provide students with a richer and more meaningful experience. Additionally, Montero & Geducos also found that students conceptualize difficult scientific concepts better when they are taught with visual and multimedia representations.

Participants in this study report that laboratory experience enhances the entire lesson. The participants indicated that the microscope, identification of plant and animal tissue and the interactive laboratory provide the students with the materials to learn about the anatomy of plant and animal tissue. Furthermore, the majority of the students in the study agreed that a practical approach to learning would enhance the students’ observation skills and help them to be more engaged in class discussions. Hands-on learning provides a setting where the student can learn first-hand and fosters student-centered, interactive learning. These results are consistent with the results reported by Shreesha and Levin (2023) which indicated that the use of laboratory and experiential activities improves student observant ability, engagement, and knowledge in science.

This study's participants expressed that ICT usage along with digital resources supports the use of innovative teaching pedagogies in biology. Some of the participants suggested the following types of resources for improving student engagement and providing supplementary instruction; smartphone camera, virtual simulations, short educational videos, and interactive applications. These resources can also be used to supplement instruction when labs do not have sufficient materials or equipment. Therefore, research findings suggest that ICT provides increases accessibility, flexibility, and interactivity for delivering instruction within a classroom setting. Rams et al. (2024) concluded that ICT along with digital resources allowed students to access instruction in biology more easily, as well as provide students who do not have access to many resources for completing laboratory-based instruction, access to use of ICT in school.

The participants expressed concerns about students' conceptual errors in learning science. According to the participants, most students had difficulty distinguishing among the different types of tissue and properly identifying them by their respective functions, using the correct terminology to refer to these individual types and functions. To assist students with their learning difficulties, the participants expressed the need for clear explanations, guided instruction, and/or structured activities. Consequently, based on these findings, the lesson exemplar should provide discussions and activities written at students' levels of understanding to address their conceptual errors. Claridades and Guevarra (2021) found that many of the students were confused about the meaning of various scientific terms and concepts because they had not had any previous exposure to the scientific language (i.e., they had never been taught how to use scientific language) and/or because there were many ambiguous definitions/explanations provided for many of the scientific terms/concepts.

Several participants commented on the difficulties experienced by students when it came to learning about anatomy and physiology. They noted that most students have trouble identifying and differentiating between the general, anatomical, and physiological characteristics of the three types of connective tissues and suggested that students could benefit from teacher guidance and instruction on the appropriate ways to learn about tissues, including identifying bad misunderstandings. For instance, Claridades and Guevarra (2021) examined how students struggled with learning terminology related to anatomy and physiology because they had not been adequately prepared for this type of academic language. They also noted that many of the definitions and explanations provided to students were confusing; therefore, the students were unable to recognize many of the scientific terms associated with anatomy and physiology.

Participants shared concerns regarding challenges faced by students in the context of their learning. A sizable block of students lacks the ability to identify and comprehend the anatomical, physiological, and general characteristics that differentiate connective tissue types. Participants suggested that teachers would be able to help students learn about connective tissue through clear guidance/instruction; therefore, lessons should also provide opportunities for students to gain knowledge about their misconceptions. Claridades and Guevarra (2021) indicated that due to insufficient exposure to scientific language, most students could not accurately identify anatomical and physiological terms. Since students had limited exposure to scientific language, many of the definitions and descriptions provided were somewhat vague or ambiguous.

In the end, the respondents agreed that a great lesson exemplar will be more useful if it is contextualized through real life learning experiences. The data provide a context for biological instruction and show that connecting students' individual life experiences to the content of their biology classes is critical to learning a variety of biology concepts. Also, the use of real-life examples will boost students' interest and engagement in biology as a subject and help them appreciate how the concepts of anatomy and physiology relate to themselves. The result of this study is in line with previous research by Fitrianto & Farisi (2025) that showed giving real-world learning experiences in specific contexts can motivate, engage and value scientific behaviors. This provides context to instruction, allowing students to build a close relationship with the anatomy of plants and animals by understanding how they fit into their daily lives.

The teacher participants of the lesson exemplars exemplified the overall significant criteria of them developing the Biology 2 lesson exemplars with reference sources used in designing effective instructional materials, namely Gagné (1985), Kemp (1998), and Dick & Carey (2005). They argue that the necessary components of any useful instructional material are clearly stated desired learner outcomes, a structured body of content, instructional methods suited to the needs of learners, and a way of assessing whether learners have achieved the desired outcomes. This view was also supported, for example, by Schwab (1962) and Bloom (1956), who suggested that inquiry learning, experiential learning and the assessment of students' knowledge, skills and attitudes would be important considerations. The biology teachers recommended that the effective teaching/learning would be achieved through the use of activities that are both engaging and educational, visual and multimedia resources, the use of Information and Communications Technology (ICT) in the teaching/learning process, application of concepts to real-life situations and flexibility in lesson planning. The findings of this study suggest that the biology 2 lesson exemplar is a learner-centered, interactive tool that is aligned with the grade 11 curriculum and caters for the diverse needs of all grade 11 learners.

Problem 2. How was the lesson exemplar developed following the ADDIE instructional design model?

The developed lesson exemplars consist of eight and cover the competencies in Plant and Animal Tissues in Biology 11. Each lesson exemplar includes learning objectives, learning activities, instructional resources, formative and summative assessments, and teacher guidance, all aligned with the MATATAG Curriculum.

Analysis Phase (February 2026)**.** FGDs were held with six Biology Teachers during the Analysis Phase to determine the types of instructional needs, learning challenges, and necessary prerequisites for Teaching Plant and Animal Tissues. The results show that teachers need contextually based activities, visual materials to illustrate concepts, and other resources that could enhance instruction. The output from the Analysis Phase was a list of instructional requirements used to develop the Lesson Exemplar.

Design Phase (February 2026). Using the results of the Analysis Phase, the lesson structure and framework of the Lesson Exemplar were developed. The learning expectations, learning objectives, instructional strategies, assessment methods, learning activities, and resource needs are aligned with the MATATAG Curriculum. The outputs from the Design Phase consist of the Lesson Exemplar Blueprint, Instructional Framework, Lesson Sequence, and Assessment Plan.

Development Phase (March 2026). The actual lesson exemplar was produced in the Development Phase (March 2026). Eight lessons exemplars were developed and supported with PowerPoint presentations, worksheets, assessment tools, guides for teachers, illustrations and QR codes that linked to more digital resources. These QR codes have been added to provide teachers with quick access to instructional videos, digital references, and other learning resources that will support the teaching of Plant and Animal Tissues in Biology 11. The outcome of this phase was a draft lesson exemplar that consisted of eight lesson exemplars and instructional materials.

Implementation Phase (April 2026)**.** The draft lesson exemplar shall be submitted to the expert validators for evaluation using the DepEd LRMDS Evaluation Tool. Validators will judge the entry on four general criteria: content, format, presentation and organization, and accuracy and currency. Their evaluations will provide the first validation results and recommendations for improvement.

Evaluation Phase (April 2026). The first evaluation of the lesson examples was conducted, and expert validators provided their feedback. Evaluation Stage has two major components: 1) First evaluation of the lesson examples by expert validators, and 2) Second evaluation after the recommended revisions are included. This step aimed to ensure that previous problems had been resolved and that the instructional materials as a whole had been enhanced. One aspect of this validation was a re-evaluation of previously validated lesson example(s) that had included a QR code to access additional instructional materials or resources. The final output from the Evaluation Phase was a validated and finalized set of lesson exemplars rated at a Very Satisfactory level and are therefore appropriate for use by Biology Teachers in teaching Plant Tissues, Animal Tissues, and Biology 11.

Problem 3. What is the level of validity of the lesson exemplar as evaluated by expert validators in terms of content, format, presentation, organization, and the accuracy and up-to-datedness of the information?

Table 4 presents the content evaluation results for the eight lesson exemplars developed to teach Plant and Animal Tissues in Biology 11. The eight lesson exemplars correspond to the eight learning competencies identified under the topic and were developed to provide teachers with structured instructional guides aligned with the MATATAG Curriculum.

Table 4: ***Results of the Evaluation of Experts Based on Content.***

Item	LE1	LE2	LE3	LE4	LE5	LE6	LE7	LE8	Mean Score
1. Content is suitable to the student's level of development.	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
2. Material contributes to the achievement of specific objectives of the subject area and grade/year level for which it is intended.	3.7	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4
3. Material provides for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem solving, etc.	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.5

4. Material is free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.0	3.0	3.3	3.3	3.0	3.0	3.0	3.0	3.1
5. Material enhances the development of desirable values and traits.	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
6. Material has the potential to arouse interest of target reader.	3.7	3.3	3.7	3.7	3.7	3.7	3.7	3.7	3.7
7. Adequate warning/cautionary notes are provided in topics and activities where safety and health are of concern.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total	24.0	23.3	24.0	24.0	24.0	24.0	24.0	24.0	**23.9**
Remarks: Very Satisfactory (Passed)									

Note: LE stands for Lesson Exemplar. LE1–LE8 represent Lesson Exemplars 1–8, respectively.

The data revealed that the most highly rated content by the respondents were "Content is appropriate to the student's level of development," "Material supports the development of desirable values and qualities," and "Material may be a good source of interest for the intended reader," all of which received a mean score of 3.7, indicating that generic descriptors support the conclusion that the lesson exemplars for this study were appropriate for the developmental level of the Grade 11 students and had the potential to promote positive value and involvement among the students. Overall, the high average indicates that the activities, discussions and instructional tasks in the materials are relevant, valuable and interesting for the students targeted by these activities. Moreover, findings suggested that the lesson exemplars created in the present study were of students' interest, and were content and pedagogically appropriate and student-centered.

Jerome Bruner's Constructivist Learning Theory (1961) states that students are involved actively in learning when they are presented with developmentally appropriate, meaningful and stimulating instructional materials. The lesson exemplar was rated by expert evaluators as very high in developmentally-appropriateness, learner interest and value creation. Therefore, the Grade 11 students were provided with meaningful and learner-centered learning experiences through the use of these instructional materials.

The cautioning/alerting notes regarding health and safety concerns received the lowest mean score (3.0), or Satisfactory. Therefore, it appears that the reviewers accepted the comments regarding the need to operate equipment safely. Still, more emphasis is needed on operating equipment safely and on observing laboratories. The smaller number of cases may have been affected by the inability to adequately emphasize health and safety in certain lesson exemplars (e.g., descriptions of Safety Procedures and Guidelines for Students). All of this suggests that there should be greater emphasis on providing clear and thorough investigations of biological safety in Biology instructional materials.

Clear safety indicators used in educational materials (Navarro et al., 2024) should assist students in consistently practicing safe procedures during labs and following expectations while in the lab. Due to the relatively low ratings for these two types of reports (e.g., safety and precautionary) by the expert panel, the panel also concluded that additional clearly defined and comprehensive procedures should be established for proper observation in laboratories and the use of laboratory equipment.

The overall average score of all lesson exemplars was 23.9 which is very satisfactory and shows that the Biology lesson exemplars for grade 11 are in line with the quality, appropriateness and relevance standards for grade 11 students. We would expect all instructional materials developed from the biology lesson exemplars to provide a quality learning experience, develop higher level thinking skills and meet the educational needs of all students. The evaluator observed that the lesson exemplars meet the stated standards and will be suitable for classroom use after the lessons have been reviewed by experts.

Expert validators will have completed their first evaluation of the lesson examples. There are two components of the Evaluation Stage: 1) Expert validators' first evaluation of the lesson examples; and 2) the expert validators' second evaluation after the suggested revisions have been included. This verification confirms that prior problems have been addressed and that the overall quality of all instructional materials has improved. The validated lesson exemplar that had been rated Very Satisfactory before using a QR Code were re-evaluated for validation. The results from the Evaluation Stage will provide model, validated for use by general public and teachers that would like to use them to teach Plant Tissue, Animal Tissue and Biology 11. 3. All the validated exemplar were rated Very Satisfactory.

Table 5 presents the results of the expert evaluation of the format of the developed lesson exemplar for teaching plant and animal tissues in Grade 11 Biology.

Table 5: ***Results of the Evaluation of Experts Based on Format.***

Item	LE1	LE2	LE3	LE4	LE5	LE6	LE7	LE8	Mean Score
1. Prints									
1.1 Size of letters is appropriate to the intended user.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.2 Spaces between letters and words facilitate reading.	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.3 Font is easy to read.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.4 Printing is of good quality (i.e., no broken letters, even density, correct alignment, properly placed screen registration).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2. Illustrations									
2.1 Simple and easily recognizable.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2.2 Clarify and supplement the text.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2.3 Properly labeled or captioned (if applicable)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2.4 Realistic/appropriate colors.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2.5 Attractive and appealing.	4.0	3.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0
2.6 Culturally relevant	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.5
3. Design and Layout									
3.1 Attractive and pleasing to look at.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
3.2 Simple (i.e., does not distract the attention of the reader).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
3.3 Adequate illustration in relation to text.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
3.4 Harmonious blending of elements (e.g., illustrations and text).	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
4. Paper and Binding									
4.1 Paper used contributes to easy reading.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4.2 Durable binding to withstand frequent use	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5. Size and Weight of Resource									
5.1 Easy to handle.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.2 Relatively light.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total	70.7	70.3	70.7	70.7	71.0	71.0	71.0	71.0	70.8
Remarks: Very Satisfactory									**Passed**

Note: LE stands for Lesson Exemplar. LE1–LE8 represent Lesson Exemplars 1–8, respectively.

Multiple items with mean rated 4.0 and above which is the verbal interpretation of "Very Satisfactory". These mean scores show the satisfaction level of the experts in the following aspects of the materials: Size of letter, Readability of font, Quality of print, Clarity and identification of illustrations, Attractiveness of design and layout, Adequacy of illustrations, Durability of binding, Ease of use of the material. The experts generally agreed that the exemplar lesson materials were visually organized, easy to read and suitable for practical use in a classroom setting. The mean scores indicated a high convergence of opinion among the experts that the exemplar lesson materials were professionally made, had a design and format that was student-friendly, and would enable Grade 11 students to use and understand the given instructional material in the examples easily.
Montero & Geducos (2023): their study was based on (see Montero, Geducos). The study of Montero & Geducos supports what has been said earlier that organized instructional materials are very important for learners' success. All aspects of the example, lesson readability, illustration clarity, layout attractiveness and usability were rated positively by all experts. The example was rated positively on average for all four criteria. Thus, the example is functional for the classroom, looks good and will work in the classroom.

On the other hand, the item "Culturally relevant" received the lowest mean score of 3.5 that was still verbally rated as Very Satisfactory. Regarding cultural appropriateness of the instructional materials, the experts viewed the materials as appropriate and acceptable. However, some parts of the lesson example may need to offer more contextualized examples and create localized representations to boost their cultural relevance. The lower rating may partly be explained by the fact that some illustrations, activities or examples do not sufficiently reflect the local experiences or culture of the learners. However, the instructional material was generally relevant and acceptable to the target learners.

Fitrianto and Farisi (2025) have highlighted the importance of using culturally relevant materials that are appropriate for the students' age group and relevant to where they live, for students to understand and connect with the content of their lessons. They noted that most instructional materials had rather low cultural relevance ratings, thus integrating materials with a higher local cultural relevance provides a stronger connection to the prior learning experiences of students and a better ability to visually represent the home environments of students.

The average total mean score for the lesson example was 70.8, rated as very satisfactory, in meeting the standards expected regarding readability, visual layout/design, organization and usability. The evaluation indicated that the instructional materials supported classroom instruction and provided the appropriate levels of student engagement. The example of the lesson looks well organized, visually appealing and appropriate for Grade 11 Biology students.

The results of the present analysis are consistent with those of Rams et al. (2024) that instructional materials must be well organized, readable, and visually attractive to promote student engagement and facilitate their use in classrooms, concludes the study. Expert ratings of the lesson examples supported research that exemplary instructional materials meeting the necessary criteria of organization, visual attractiveness, and readability at high levels exist. Therefore, it is strongly supported that the materials provided in this study and used as lesson examples met these criteria, thus providing evidence that recommended exemplary instructional materials can be used to provide students with a positive learning experience in Biology.

Table 6 presents the results of the expert evaluation of the presentation and organization of the developed lesson exemplar for teaching plant and animal tissues in Grade 11 Biology.

Table 6: ***Results of the Evaluation of Experts Based on Presentation and Organization.***

Item	LE1	LE2	LE3	LE4	LE5	LE6	LE7	LE8	Mean Score
1. Presentation is engaging, interesting, and understandable.	3.7	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4
2. There is a logical and smooth flow of ideas.	3.7	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.6
3. Vocabulary level is adapted to the target reader's likely experience and level of understanding.	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
4. Length of sentences is suited to the comprehension level of the target reader.	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
5. Sentences and paragraph structures are	3.3	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7

varied and interesting to the target reader.									
Total	17.3	17.3	17.3	17.3	17.7	17.7	17.7	17.7	17.5
Remarks: Very Satisfactory									**Passed**

Note: LE stands for Lesson Exemplar. LE1–LE8 represent Lesson Exemplars 1–8, respectively.

The findings revealed that the item "Vocabulary level is adapted to target readers' likely experience and level of understanding" gained the highest mean score of 3.7 interpreted as Very Satisfactory. The experts generally agreed that the words, terminologies and language used in the lesson exemplar were appropriate for the learners of Grade 11. The high rating also indicates that the instructional material used understandable and learner-friendly language that allowed for effective communication of biological concepts. Furthermore, the results indicate that the students could understand the lesson more easily because of the vocabulary choices, which made the lesson more accessible and meaningful.

Claridades and Guevarra (2021) posit that an educational resource is more effective if it is written at a vocabulary level that corresponds to the learner's cognitive (understanding) ability and prior knowledge of the topic. This finding is consistent with the opinions of experienced teachers who used this lesson as a model. Three experts rated this lesson exemplar. They were three different levels of excellence which they used as the basis for their ratings. All agreed that the vocabulary used in this lesson is "learner-friendly" and makes the biological concepts they teach much easier for the Grade 11 learners to understand and connect with.

In this material, the overall sentence length was adequate for the audience's reading ability, but ratings were lowest (average of 3.3), indicating it could be improved. Both the processing capacity of the audience and the length of the sentence have a marked influence on the understanding of the sentence. If the sentences were of a good length but the majority of the phrases were longer and/or more complex words or phrases then this would detrimentally affect an audience's ability to read and/or comprehend them. The instructional materials offered by the authors of this document generally satisfied the needs and were appropriate for teaching students with their written and/or oral presentations.

In 2020, Camaso found similar results suggesting that longer and/or more complex words may be negatively correlated with students' ability to understand a text (particularly in technical language where concepts tend to be more conceptual than literal). The short sentences also support this statement; as subject matter experts have identified, there are still some simplifications that can be made to explanations in the lesson exemplar to better enhance learner understanding.

The mean score of 17.5, "Very Satisfactory," with "Pass" for demonstrating the sample lesson shows that the presentation shows clarity, logical sequence and the organization of the sample lesson is clear and would be appropriate for the Grade 11 instructional materials. The sample lesson was well-structured with appropriate discussion points that provided the students with the necessary information to develop meaningful learning experiences. The sample lesson thus provided a neat, orderly set of formats that showed ways of delivering instruction that were friendly to teaching students.

The findings of this study support the Vygotsky's (1978) Constructivist Learning Theory, which states that learners can construct learning experiences through the assistance of a well-organized material in their environment. The Lesson Exemplar was rated by the experts as a very satisfactory submission due to the logical organization, clear explanation of the content provided, use of the learner's point of view, and appropriateness for teaching biology to Grade 11 students.

Table 7 presents the results of the expert evaluation based on the accuracy and up-to-datedness of the information in the developed lesson exemplar for teaching plant and animal tissues in Grade 11 Biology.

Table 7: ***Results of the Evaluation of Experts Based on Accuracy and Up-to-datedness of Information***

Item	LE1	LE2	LE3	LE4	LE5	LE6	LE7	LE8	Mean Score
1. Conceptual errors	3.0	2.7	3.0	2.7	2.7	2.7	2.7	2.7	2.8
2. Factual errors	3.0	2.7	3.0	2.7	2.7	2.7	2.7	2.7	2.8
3. Grammatical errors	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4. Computational errors.	3.7	3.3	3.7	3.3	3.3	3.7	3.3	3.3	3.5
5. Obsolete information	3.3	3.3	3.7	3.3	3.3	3.7	3.3	3.3	3.4
6. Typographical and other minor errors (e.g., inappropriate or unclear illustrations, missing labels, wrong captions, etc.).	4.0	4.0	4.0	3.7	3.7	4.0	3.7	3.7	3.9
Total	20.	19.0	20.3	18.7	18.7	19.7	18.7	18.7	19.2
Remarks: Errors present									**Failed**

Note: LE stands for Lesson Exemplar. LE1–LE8 represent Lesson Exemplars 1–8, respectively.

The total error and failure classifications of the lesson exemplars were recorded and the average score was 19.2 points. This implies that conceptual error(s), factual error(s), grammatical error(s), computation error(s), and typographical errors will need to be revised during the initial validation of the lesson exemplars. Needs further improvement to improve the accuracy/correctness and reliability/up-to-datedness of information provided in instructional materials.

According to the findings about the typographical and other errors (such as wrong/too difficult/cannot locate) in illustrations or other components of the instruction, the expert evaluations were an average of 3.9, the highest rating possible, with the same expert having identified very few errors in the example lesson of instructional materials. The conclusion of this report indicates very high quality of the illustrative materials (attributable to a high percentage of accurate graphics, readable text, and comprehensible examples) based on expert evaluations; thus, good quality has continued to be present in the instructional materials, with minimal areas that may need updating.

Manicio et al. (2022) have indicated that the clarity of instructional material will depend on the clarity of illustrations and captions in its technical presentation (p. 104). Upon evaluating the instructional materials, the researchers determined that only a few typographical and/or technical errors existed. This, along with the clarity and organization of lesson exemplars and the appropriateness of visual elements viewed from an instructional standpoint, supports the use of these instructional materials in class.

Experts rated conceptual error items (M=2.78) and factual error items (M=2.78) the two lowest mean scores indicating numerous inconsistencies between conceptually and factually, and, as such, instructional materials must be revised prior to being deemed suitable for classroom use. Responses to these items supported the finding that several of the exemplar lessons lacked sufficient accuracy and/or clarity in presenting biological concepts, including their explanations, terminology, and science-related discussions. The findings with respect to "Old Information" indicated that several pieces of content, example(s), and/or supporting material(s), needed to be reviewed to verify that they were current and valid. Overall, the results suggest that having scientifically valid, up-to-date instructional materials is critical to the successful delivery of instruction in the classroom.

The primary function of scientific educational materials is to show that they are factually true and conceptually accurate (Shreesha & Levin, 2023). Fact and concept-based errors were rated low. There is evidence of many inconsistencies in the science area. Experts evaluated the material and identified a number of changes that had to be made to the content before it could be used.

Revisions were made to correct conceptual, factual, grammatical/computational and/or technical errors following the evaluation of the Lesson Exemplars. The evaluation is also a basis for improving the instructional materials prior to revalidation of the Lesson Exemplars. The evaluation also indicates that the ADDIE Instructional Design Model aids in reassessing the instructional materials through the feedback of the validators. The Lesson Exemplars were revised, based on the recommendation of the validators, for accuracy, reliability, quality of instruction and appropriateness to the classroom.

Problem 4. What are the observations and feedback of the expert validators and teacher-evaluators regarding the strengths and areas for improvement of the lesson exemplar?

Table 8 presents the experts' observations and feedback on the developed lesson exemplar for teaching plant and animal tissues in Grade 11 Biology

Table 8: ***Experts' Observations and Feedback on the Developed Lesson Exemplars.***

Expert Validator	Observations	Feedback For Improvement
Validator 1	The lesson exemplar contains clear instructions and well-sequenced activities that are easy for both teachers and learners to follow. Incorporating visuals and activities into your teaching helps your students stay engaged during instruction. The designed layout and presentation will enable the teacher to deliver instruction effectively and support students' understanding of what is being taught.	Some vocabulary and activities still need to be reevaluated to better align with students' developmental levels.

Validator 2	The objectives, activities, and assessments are well aligned and support smooth classroom instruction. The lesson exemplar contains contextualized and meaningful examples suited to learners' experiences. The exemplar is visually organized and can be implemented easily in a classroom setting.	Additional activities for reinforcement, as well as student-centered exercises, could be performed to enhance supported retention of the vocabulary.
Validator 3	The vocabulary words and activities are appropriate for the developmental level of Grade 11 learners. The activities encourage active participation, learner interaction, and classroom engagement.	Some instructions need simplification and clearer placement to improve learner understanding. Some visual elements (e.g., spacing) and navigational features may need improvement to enhance accessibility and usability for learners further.

The evaluators reported that the lesson exemplar provided an appropriately ordered basis for developing an instructional unit focused on student needs, had effective instructional and assessment structures aligned to help create a successful instructional environment for teaching and learning, and contained effective written instructions with logical sequencing. The efficacy of the instructional materials would be determined by their use, as exemplified in the lesson prototype guide, to provide a more effective instructional environment and to support the evaluators' conclusion that the instructional prototype could serve as a productive resource for both instructors and students during the lesson's implementation.

Using examples, images, and hands-on or interactive activities helps learners to be engaged in their lessons. This idea has been supported by research conducted by Fitrianto & Farisi (2025) on how interactive and contextualized classroom activities can increase both interest and involvement in science instruction. Accordingly, incorporating interactive, contextualized instructional activities into a science lesson will improve overall effectiveness by using learner-centered, meaningful classroom experiences.

Students' vocabulary, activities and teaching materials were appropriate to their development and learning processes, the validators noted. The sample lesson was visually organized and convenient for classroom use. The arrangement and presentation of the lesson will help teachers in their facilitation and students in their understanding of the lesson. The findings are consistent with the Theory of Cognitive Development by Jean Piaget (1936) which posits that students learn more effectively when the materials are developmentally appropriate, matching their cognitive abilities and readiness to learn.

The lesson exemplars validators noted various strengths and areas for improvement. The validators suggested that the vocabulary items/activities in the lesson exemplar be adjusted to the learner's current readiness level; that learner-centered and learning-reinforcing activities be included in the lesson example to encourage vocabulary retention and understanding; and that the instructional materials be simplified and clarified through visual presentation. There are also a number of areas where improvements are needed in visual design, layout, and movement through the lesson exemplar; all of these aspects would directly impact how students' access, use, and present the lesson. Rams et al. (2024) To make the learning experience good, all learning resources must have the following aspects: organization, easy to read format, practicality in real-life situations for the learner, and positive learning experiences have also been validated by the validator.

Problem 5. What revisions can be made to improve the lesson exemplar based on validation results?

Table 9 presents the results of the experts' evaluation of the revised lesson exemplar based on content.

Table 9: ***Results of the Expert Evaluation Before and After Revision Based on Content.***

Item	**Initial Evaluation Mean Score**	**Final Evaluation Mean Score**
1. Content is suitable to the student's level of development.	3.7	4.0
2. Material contributes to the achievement of specific objectives of the subject area and grade/year level for which it is intended.	3.4	4.0
3. Material provides for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem solving, etc.	3.5	4.0
4. Material is free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.1	4.0
5. Material enhances the development of desirable values and traits.	3.7	4.0
6. Material has the potential to arouse interest of target reader.	3.7	4.0

7. Adequate warning/cautionary notes are provided in topics and activities where safety and health are of concern.	3.0	3.7
Total	23.9	27.7
Remarks: Very Satisfactory	**Passed**	**Passed**

In the data, six indicators reached the maximum average score of 4.0 and were described in words as “Very Satisfactory”. They were categorized as follows: Meets the grade level of the student population; Supports the achievement of instructional objectives; Helps foster students’ higher-order reasoning skills; Is free of bias; Promotes positive, value-based behavior; And sparks students’ interest. The learning experiences were adapted to align with the inquiry-based tasks, and the content was designed to be student-centered, value-based, and unbiased, resulting in a better final evaluation score than the first evaluation. The average score for the item “Adequate Cautionary Notes for All Safety and Health-Related Topics and Activities” was 3.7. The lowest mean score, but rated very satisfactory because of sufficient cautionary notes being provided.

The Constructivist Theory of Learning (Bruner, 1966), proposed by Jerome Bruner, provides a guide to learning through interaction and personal involvement in the learning process and in the construction and assignment of meaning. The expert review of the revised lesson plan demonstrates this. Experts rated the newly revised lesson as very satisfactory. After reviewing all components of the lesson, experts determined that the materials were appropriate for the child's development and provided opportunities for the child to develop interest and values, as well as to develop a learning process.

The lowest mean score was 3.7 for the item "Adequate cautionary notes are provided for all safety and health-related topics and activities". It was, however, still considered very satisfactory in having adequate cautionary notes. The increase from the final (4.0) mean rating as compared to the original evaluated rating of 3.0 suggests that the revisions made to the safety reminders, laboratory safety guidelines, and cautionary notes are sufficient to integrate health and safety into the learning activities. This slightly lower rating could however also indicate that there is still room for improvement in safety guidelines and/or lab safety guidelines. Nevertheless, this result supports that the revised lesson exemplar includes sufficient health and safety considerations in all aspects of the learning activities.

Navarro et al. (2024) also support these findings, stating that all science curricular materials must have safety reminders and precautions in a consistent, uniform way for all science activities involving laboratory observations or scientific procedures. Safety/cautionary information received the lowest mean scores of the areas measured. However, a significant number of experts favored the inclusion of more laboratory safety precautions and additional examples of health-related reminders in all lesson exemplars presented.

The mean score of the revised lesson exemplars was 27.7. This means that the students achieved a ‘Very Satisfactory’ degree of accomplishment as shown in the ‘Passed’ comment on the report card. The total mean scores of the revised lesson exemplars were further supported by the average score from the preliminary evaluation (23.9). The changes made to the instructional materials showed improved instructional quality and thus increased relevance and supported student motivation, critical thinking, and classroom engagement. These (improved) lesson exemplars were aligned to (local) curriculum standards and were classified as acceptable and had been approved for use in grade 11 during the revision process.

These results further support the results of Manicio et al. (2011) wherein it was found that the instructional materials were more effective when revised based on the feedback and validation results from experts (i.e., feedback from educational evaluators), as reported by Manicio et al. (2011). The experts’ evaluation on the revised lesson exemplar as Very Satisfactory in general supports this study as it points out that the lesson exemplar shows improvement on the quality of instruction, alignment with the curriculum, learner engagement and overall appropriateness for the Grade 11 Biology instruction.

Table 10 presents the results of the experts' evaluation of the revision of the lesson exemplar in terms of format.

Table 10: ***Results of the Expert Evaluation Before and After the Revision Based on Format***

Item	**Initial Evaluation Mean Score**	**Final Evaluation Mean Score**
1. Prints		
1.1 Size of letters is appropriate to the intended user.	4.0	4.0
1.2 Spaces between letters and words facilitate reading.	3.7	4.0

1.3 Font is easy to read.	4.0	4.0
1.4 Printing is of good quality (i.e., no broken letters, even density, correct alignment, properly placed screen	4.0	4.0
2. Illustrations		
2.1 Simple and easily recognizable.	4.0	4.0
2.2 Clarify and supplement the text.	4.0	4.0
2.3 Properly labeled or captioned (if applicable)	4.0	4.0
2.4 Realistic/appropriate colors.	4.0	4.0
2.5 Attractive and appealing.	4.0	4.0
2.6 Culturally relevant	3.5	3.7
3. Design and Layout		
3.1 Attractive and pleasing to look at.	4.0	4.0
3.2 Simple (i.e., does not distract the attention of the reader).	4.0	4.0
3.3 Adequate illustration in relation to text.	4.0	4.0
3.4 Harmonious blending of elements (e.g., illustrations and t	3.7	4.0
4. Paper and Binding		
4.1 Paper used contributes to easy reading.	4.0	4.0
4.2 Durable binding to withstand frequent use	4.0	4.0
5. Size and Weight of Resource		
5.1 Easy to handle.	4.0	4.0
5.2 Relatively light.	4.0	4.0
Total	70.8	71.7
Remarks: Very Satisfactory	**Passed**	**Passed**

The results indicate that the average score for each indicator was extremely satisfactory (4.0). This included the readability of printed text, high-quality printing, good clarity/attractiveness of illustrations, and ease of use due to general durability and easy access to instructional materials for classroom use. Increased space between printed materials and illustrations; increased blending of illustrations with text; and increased use of contextual images increased ratings on indicators from the second evaluation versus the first evaluation. The consistently high ratings obtained provide evidence that revisions to printed materials successfully enhanced the visual quality of content (readability) and the overall usability of the lesson exemplar. Furthermore, the results of this study indicate that users will find revised printed materials to be more user-friendly, visually appealing, and more practical than previously developed print materials.

According to Rams et al. (2024), instructional materials that are clear, structured, and readable font, interesting, attractive images, and generally easy to read improves learners' understanding and the usability of the materials in science instruction. The modified lesson exemplar, as modified by the experts, received very high ratings for its modifications; this is consistent with what is currently known in the literature on the topic. Ultimately, the revised lesson exemplar was a much more readable product, with a more appropriate presentation to the class and a more logical organizational structure for the learner.

The Average score of 3.7 is the second lowest and translates to a “very satisfactory” rating for “culturally relevant. The average score has risen from below 3.7 to above 3.7 compared to the first rating, which means that the improvements made in contextualizing examples and illustrations have increased the cultural relevance of instructional materials. Although the average score did increase, the score still indicates a need for more locally and culturally responsive examples to increase overall lesson relevance for the target population. Overall, evaluators reported that they believe the lessons are appropriate and acceptable to the intended audience.

Fitrianto and Farisi (2025) provided similar support for this conclusion and confirmed the strong need to provide authentic, meaningful learning opportunities for all students through culturally responsive, contextually based teaching resources. Authors who rated items lower in terms of their cultural relevance have recommended using more local examples and contextually based representations of the material to strengthen further the link between the material presented to learners and how those learners relate to the examples.

An overall average score on the revised lesson exemplar is 71.7, and is therefore considered “Very Satisfactory” (no statement of failure) based on verbal descriptions of the results to date since its first evaluation (an average score of 70.8). The modifications to the overall average of the first evaluation (according to state standards) and to the instructional materials used in the classroom will provide teachers with an adequate instructional resource to use in their Grade 11 Biology lessons.

According to Montero and Geducos (2022), good instructional materials are easy to see, well-organized, and can be used successfully to increase student engagement and support instruction in class. The overall evaluation of the sample lesson was Very Satisfactory by the experts who assessed it and was supported by the literature, as the materials met the expected standards for readability, visual appeal, usability, and overall instructional organization in grade 11 Biology.

Table 11 shows the results of the experts' evaluation of the lesson exemplar after its revision, based on presentation and organization.

Table 11: ***Results of the Expert Evaluation Before and After the Revision Based on Presentation and Organization.***

Item	Initial Evaluation Mean Score	Final Evaluation Mean Score
1. Presentation is engaging, interesting, and understandable.	3.4	4.0
2. There is a logical and smooth flow of ideas.	3.6	4.0
3. Vocabulary level is adapted to the target reader's likely experience and level of understanding.	3.7	4.0
4. Length of sentences is suited to the comprehension level of the target reader.	3.3	4.0
5. Sentences and paragraph structures are varied and interesting to the target reader.	3.7	4.0
Total	17.5	20.0
Remarks: Very Satisfactory	**Passed**	**Passed**

Overall, the evaluation yielded five satisfactory criteria, each with a mean score of 4.0 (satisfactory level). The five criteria were: interactive presentation/engaging material presentation, logical flow of ideas, proper use of vocabulary, proper sentence length, and variety of well-organized sentence/paragraph structures. The difference between the initial and revised evaluations of the lesson exemplar lay in the organization of ideas, the construction of individual sentences, the suitability of the vocabulary used, and the presentation of the material for discussion. As a consequence of the subsequent or final evaluation, the scores were higher than in the initial evaluation. There were also recommendations made by one evaluator at the pre-defense exhibition that suggested (as an illustration) the need for a Teacher's Guide to support teachers with accessing and using the lesson exemplar. Consequently, a Teachers' Guide was written that contains instructional procedures and guidelines for teaching the lesson. The ratings for the revised Lessons were consistent across clarity, readability, and organization. Additionally, the findings indicate that the students at the Grade 11 level were presented with lessons that were easy to read, followed a logical sequence, and were suitable for their needs.

The results support the Constructivist Learning Theory of Lev Vygotsky (1978) that learning resources should be developed to provide the learner with a set of easily understood, well-organized and clearly presented materials to facilitate meaningful learning and cognitive development. The revision of the lesson exemplar received positive feedback from all the expert reviewers as the revised material was easy to read and understand, presented a logical sequence of ideas and would appeal to Grade 11 learners.

Every indicator achieved a mean score of 4.0, the highest possible score; no indicator received the lowest rating during the evaluation phase. The previous evaluation scores, awarded a perfect 4.0 rating, show that there has been a measured successful improvement based on the revision process, as they have now been granted perfect scores uniformly. The perfect uniformity among the reviewers on both samples suggests that each reviewer has like-minded opinions regarding the impact of the revised lesson example on its presentation and organization. Overall, the results show that the total number of reviews of the entire structure, clarity, sequence, and readability of the lesson example are highly acceptable at the time of the revision review.

Claridades and Guevarra (2021) found that learning materials are more effective when they include vocabulary, sentence patterns, and topics aligned with an individual student's ability. All experts gave the lesson examples a high mean evaluation score, which was consistent with the previous body of literature; authors had supplied their information in a simplified manner by way of reading, including discussions rather than only reading the contents, and formatted their sentences in a sequence that followed some logical order when presenting it. The revised example lesson had an overall mean evaluation score of 20.0, and based upon a verbal interpretation, was judged acceptable (to very satisfactory) as well as having passed. The score for the example was 17.5 before any changes were made, indicating a dramatic improvement since its initial review. Therefore, the increase in the overall mean score indicates that the example was successfully modified after its review. This common finding shows that the manner in which the instructional material was presented and organized met all of the criteria specified for effective instructional materials; i.e., learner-centered and crystal clear. The findings in the revised example lesson show that the examples will be easy to use and learn from. The current example is now seen as appropriate and usable for Grade 11 Biology classrooms.

Manicio et al. (2024) found that the students' understanding, engagement, and academic achievement improve if materials are developed using systematic and learner-centered approaches. The IRR passed the criteria of quality instruction in a Grade 11 Biology classroom in all the three categories mentioned above (coherence, readability, organization). The experts also rated this revised lesson as Very Satisfactory based on the assessment of the established expert panel. Table 12 presents the expert ratings of the updated lesson example on the correctness and up-to-datedness of the information contained therein.

Table 12: ***Results of the Expert Evaluation Before and After the Revision Based on Accuracy and Up-to-datedness of Information.***

Item	**Initial Evaluation Mean Score**	**Final Evaluation Mean Score**
1. Conceptual errors	2.8	4.0
2. Factual errors	2.8	4.0
3. Grammatical errors	3.0	4.0
4. Computational errors.	3.5	4.0
5. Obsolete information	3.4	4.0
6. Typographical and other minor errors (e.g., inappropriate or unclear illustrations, missing labels, wrong captions, etc.).	3.9	4.0
Total	19.2	24.0
	Failed	**Passed**
Remarks:	**Errors present**	**Errors not present**

The mean scores for all indicators were identical (4.0), along with their verbal descriptions (very satisfactory (VS)). The indicators refer to errors made in various areas, such as conceptual, factual, grammatical, and computational errors, as well as obsolete information; typographical and other minor errors were also considered products of errors. Corrections and improvements to all previously established conceptual and factual inaccuracies were made; grammatical improvements were made to all instances of incorrect usage; information was updated (current); typographical and technical errors were corrected; as a result, the final evaluation received all perfect scores. As a result of this; the measures demonstrated through this study indicate that the new instructional materials are reliable, consistent, accurate, and clear in terms of the biological concepts, experiences, and knowledge that they convey.

Shreesha and Levin (2023) confirm this by showing that to define teaching materials accurately includes a three-pronged approach of being conceptual (defining the content to be taught), factual (certifying that it is defined accurately), and technical (presenting what has been certified to students). In doing this, the experts who validated the completed updated lesson exemplar were able to identify all areas of error within the original validation process were addressed by correcting the original errors that existed conceptually, factually, grammatically, typographically.

Since every indicator received a rating of 4, it is reasonable to assume there were no poor ratings for these indicators, so we can conclude that all indicators have received perfect evaluations from previous evaluations, that there has been enough improvement to correct problems identified in the original validation process. The results indicate that experts found that there were no errors in the lesson exemplar: conceptual, factual, grammatical, computational, or typographical. Experts gave all indicators the same score; thus, they also have increased credibility and quality with respect to all instructional materials after revision, and therefore, the lesson exemplar is accurate and correct. This study demonstrates that the application of the ADDIE framework offers an avenue for continuous development of instructional resources by way of professional review and systematic refinement at the evaluation and revision stages. Evaluators rated the revisions on the dimensions of improved clarity, accuracy, consistency and characteristics of the lesson sample. All evaluators rated these revisions very highly.

The average score (24.0) obtained from the second assessment of the revised lesson exemplar was significantly improved from the first assessment (19.2). Hence, the revision of the lesson exemplar has resulted in a significant improvement in all the average scores. As shown here, the changes made in the original assessment have produced quality educational materials that can be delivered with accuracy, reliability and correct results. In addition, the revision positively affects the accuracy of the lesson exemplar and its overall results from the additional performance measures that can be evaluated with the same set of criteria as the previously evaluated performance measures. Therefore, the edited lesson exemplar is already accurate and free from errors and can be a possible option to be integrated into the curriculum of the Biological Science courses given to students in Grade 11.

The research data supports Navarro et al. (2024) especially on the quality of materials in the classroom that is, accuracy, reliability, up-to-date, technical accuracy. It follows then from this research that there is agreement from, at least, the majority of subject matter experts regarding the overall improvements made to the exemplar, and that it meets the standards established for accuracy, reliability and appropriateness for teaching grade 11 biology.

Credibility and Objectivity of the Evaluation Process

Independent expert validators with significant credentials in the areas of curriculum development, learning resource assessment, and instruction supervision validated the instructional materials. All validators utilized pre-established professional qualifications/criteria to evaluate and validate the instructional materials according to their qualifications as validators of the materials.

The validators used the Department of Education's Learning Resources Management and Development System (LRMDS) standardized evaluation tool for printed resources to evaluate the Lesson Exemplar. Using an established standardized evaluation tool allowed all validators to evaluate the Lesson Exemplar according to consistency and reduce subjectivity in their evaluations through the guidelines provided in LRMDS, which established equal criteria related to content, format, presentation, and organization; accuracy and up-to-datedness of the information; for all evaluators of the Lesson Exemplar.

The validators independently assessed the lesson exemplar to prevent any potential influence from familiarity bias, personal relationships, or professional courtesy on their ratings. They rated the lesson exemplar on the quality of the instructional materials according to the evaluation criteria. The validator's written comments and recommendations on the lesson exemplar provided the basis for revisions to it.

The lesson exemplar had been assessed twice prior to writing it in order to build upon confidence in its validation, have the assessment of the evaluation component's credibility and objectivity be recorded, and build confidence in the validity of the findings from the assessment as a result of the evaluative research completed.

4. SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary

This study developed and validated a Lesson Exemplar Package on Teaching Plant and Animal Tissues for Grade 11 Biology under the MATATAG Curriculum by identifying the essential requisites in developing the lesson exemplar, describing its development using the ADDIE instructional design model, determining its level of validity in terms of content, format, presentation and organization, and accuracy and up-to-datedness of information, identifying the observations and feedback of expert validators determining the revisions made based on their comments and suggestions. The study utilized a descriptive-developmental research design and was conducted at Cabadbaran National High School, involving Biology Teachers who served as respondents, as well as biology teachers from selected Private schools. Master Teachers and the Subject Program Supervisor served as validators. The instruments used in the study were a semi-structured interview guide and the standardized

Department of Education LRMDS validation checklist, which included a qualitative feedback section. At the same time, Mean and Thematic Analysis were utilized as statistical tools to analyze the quantitative and qualitative data gathered during the study.

4.2 FINDINGS

Based on the collected and interpreted data in this study, the following findings are generated:

1. The essential requisites in the development of the lesson exemplar included inquiry-based and comparative teaching approaches, use of multimedia and visual instructional materials, hands-on and laboratory-based activities, ICT integration, contextualized learning experiences, and resource-friendly instructional strategies. These findings support the views of Jerome Bruner (1961), who emphasized inquiry and discovery learning, Joseph Schwab (1962), who highlighted inquiry-based and hands-on science instruction, and Benjamin S. Bloom (1956), who stressed the development of cognitive skills through meaningful learning activities. Participants emphasized the importance of microscope observations, diagrams, videos, contextualized examples, and learner-centered activities in improving students' understanding of plant and animal tissues.
2. The lesson exemplar was developed following the ADDIE instructional design model through the phases of Analysis, Design, Development, Implementation, and Evaluation. During the Analysis phase, the researcher identified instructional gaps and learning competencies related to plant and animal tissues under the MATATAG Curriculum. In the Design and Development phases, the lesson exemplar was systematically prepared using constructivist-aligned activities, multimedia resources, and inquiry-based learning tasks. In contrast, the Implementation and Evaluation phases involved expert validation, usability walkthroughs, revisions, and revalidation of the instructional material.
3. The initial evaluation of the lesson exemplar showed a Very Satisfactory rating in content with a mean score of 23.9, format with 70.8, and presentation and organization with 17.5, all interpreted as Passed. However, the evaluation based on the accuracy and up-to-datedness of the information obtained a mean score of 19.2 with the remark "Errors Present" and a result of Failed due to conceptual and factual inconsistencies identified by the validators. After revisions and revalidation, the lesson exemplar obtained improved ratings, with mean scores of 27.7 for content, 71.7 for format, 20.0 for presentation and organization, and 24.0 for accuracy and up-to-datedness of information, all verbally interpreted as Very Satisfactory, with remarks of Passed and "Errors not present."

4. The expert validators observed that the lesson exemplar was organized, systematic, visually appealing, and learner-centered. They highlighted strengths such as clear instructional flow, contextualized examples, interactive activities, engaging illustrations, and appropriate vocabulary suited for Grade 11 learners. However, they also recommended improving the clarity of instructions, strengthening safety reminders, refining certain vocabulary and activities, enhancing cultural relevance, and refining visual and formatting elements to increase learner accessibility and instructional effectiveness further.

5. The revisions focused on improving content accuracy, instructional clarity, sentence construction, safety precautions, formatting, visual presentation, and inquiry-based activities based on the comments and suggestions of the expert validators. Additional contextualized examples, learner-friendly discussions, improved illustrations, clearer instructions, and enhanced hands-on and inquiry-based activities were incorporated into the revised lesson exemplar. Moreover, based on the recommendation of one of the evaluators during the pre-defense exhibit, a teacher's guide containing instructional procedures and guidelines for lesson delivery was added to assist teachers in the proper utilization and implementation of the lesson exemplar. These revisions resulted in more organized, engaging, and classroom-ready instructional material for Grade 11 Biology.

4.3 CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1. The development of the lesson exemplar required the integration of inquiry-based, contextualized, multimedia-supported, and learner-centered instructional strategies to ensure meaningful and effective Biology learning experiences for Grade 11 students. This conclusion supports the Constructivist Learning Theory of Jerome Bruner (1961) and Lev Vygotsky (1978), which emphasize active learning, inquiry, learner engagement, and the construction of meaningful knowledge through interactive and contextualized learning experiences. Furthermore, the findings affirm the importance of active learning and inquiry-based instruction emphasized by Joseph Schwab (1962), who highlighted that students learn scientific concepts more effectively through exploration, hands-on activities, and guided inquiry.

2. The ADDIE instructional design model provided a systematic and effective framework for developing, validating, revising, and refining the lesson exemplar to ensure its instructional quality and curriculum alignment.

3. The expert validation results confirmed that the revised lesson exemplar achieved a very satisfactory level of quality, accuracy, organization, and instructional effectiveness, making it suitable for Grade 11 Biology instruction.
4. The observations and feedback of the expert validators demonstrated that the lesson exemplar possessed strong instructional organization and learner engagement. However, minor refinements were still necessary to further enhance clarity, accessibility, and contextual relevance.
5. The revisions made based on the comments and suggestions of the validators significantly improved the accuracy, presentation, organization, and overall instructional quality of the lesson exemplar. The inclusion of a teacher's guide further enhanced the proper use and classroom implementation of the instructional material, resulting in a validated, classroom-ready lesson exemplar.

4.4 Recommendations

Based on the findings and conclusions of this study, the following recommendations are given:

Teachers. They may use the validated lesson exemplar package as a guide for implementing contextualized, learner-centered instruction when teaching Plant and Animal Tissues.

School Administrators. They may use the study's findings to inform instructional planning, teacher support programs, and the provision of learning resources to enhance the delivery of Biology instruction in schools.

Future Researchers. They may use the findings and the validated lesson exemplar as references for conducting further studies on instructional material development, lesson exemplar validation, and innovative Biology teaching strategies across different educational contexts.

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