INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue IV
May 2024
Available online at https://www.instabrightgazette.com

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BEST PRACTICES OF SUSTAINABLE AND ECO-FRIENDLY SCHOOLS AS BASIS FOR THE DEVELOPMENT OF LEARNING MATERIALS IN JUNIOR HIGH SCHOOL SCIENCE

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ABSTRACT

Through the establishment of many initiatives in line with one of its guiding principles, Makakalikasan, the Department of Education (DepEd) strengthens and reinforces the integration of environmental education into the basic education curriculum. In fact, DepEd ordered all institutions and schools to amplify environmental education lessons across all science subjects, as well as in class discussions, activities, and drills. Due to this, educational institutions should prioritize practices and the development of instructional materials that support environmental proficiency development.

Thus, this research identified the best practices of sustainable and eco-friendly schools in Region V—Bicol, which were used as a foundation to develop the learning materials for junior high school science. Specifically, it answered the following research problems: (1) What are the best practices of sustainable and eco-friendly schools in Region V—Bicol, along the following: (a) climate change and adaptation; (b) disaster risk reduction (DRR); (c) environmental protection and conservation; and (d) sustainable development? (2) What learning materials may be developed from the identified best practices? (3) What lessons using the developed learning materials may be developed in teaching junior high school science? (4) What are the teachers' levels of acceptability of the developed learning materials and lessons?

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ISSN: 2704-3010
Volume V, Issue IV
May 2024
Available online at https://www.instabrightgazette.com

The study used a descriptive-developmental research design. The descriptive-developmental research design was utilized since one of the main goals of the study was to identify the best practices of sustainable and eco-friendly schools through documentary analysis. The designed survey instrument was utilized to collect relevant data, such as the best practices, how they are implemented, challenges and difficulties encountered during implementations, project analysis, funding requirements, and photo documentation. Hence, from the identified best practices of sustainable and eco-friendly schools, the researcher developed learning materials and lessons that can be used in teaching junior high school science in which the identified best practices were used. Furthermore, the results of the juror validation using the tools for the developed learning materials and lessons were also used, specifically the juror's evaluations, comments, suggestions, and recommendations. On the other hand, the study is quantitative in nature since the question posed was answered by numerical data in order to analyze the validation results and the teacher's level of acceptability of the developed learning materials and lessons. A weighted mean was used to statistically treat the data collected for the validation process of the developed learning materials and lessons. Furthermore, a mean percentage was used to present the collected data from the experts and to present data on the teacher's level of acceptability of the developed learning materials and lessons.

The study yielded the following results: The best practices of sustainable and eco- friendly schools implemented under (a) climate change and adaptation; (b) disaster risk reduction (DRR); (c) protection and conservation of the environment; and (d) sustainable development were identified and served as the basis for the development of learning materials. There were nine (9) learning materials developed that served as a foundation for lesson development. These learning materials followed the 5E format, which includes the following phases: engagement, exploration, explanation, elaboration, and evaluation. There were ten (9) lessons developed using the specific learning competencies from the curriculum guide, in which the best practices were also

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ISSN: 2704-3010
Volume V, Issue IV
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Available online at https://www.instabrightgazette.com

integrated. Said lessons followed the 5E instructional approach. Then, the ten science teachers determined the level of acceptability of the developed learning materials and lessons using the tool for teachers' level of acceptability.

To be more specific, the best practices of sustainable and eco-friendly schools were identified using the developed interview guide, which was validated by the experts. The interview guide was rigorously developed in order to capture all of the necessary data to develop learning materials, which is the study's major purpose. The identified best practices are strong points for schools, teachers, and environmental education implementers in order to create a high level of environmental awareness, increase environmental literacy, and instill the value of properly caring for the environment in the minds of learners.

Using the identified best practices of sustainable and eco-friendly schools, the development of learning materials has been successful. The identified sustainable and eco-friendly best practices were used to create effective and meaningful learning materials that can be used in teaching junior high school science. The developed learning materials were validated by the experts using the Department of Education's LRMDS Experts Evaluation Rating Sheets for Print and Non-Print Resources and yielded very good passing remarks from the validators, which implies recommending approval for public school use. The juror's evaluation tool on the integration of the identified best practices of sustainable and eco-friendly schools in the developed learning materials was used by the experts and yielded a mean score of 4.61, regarded as "highly integrated," implying that the identified best practices of sustainable and eco-friendly schools were successfully integrated into the materials.

The integration of the developed learning materials into the designed lessons for teaching junior high school science was also successful. Nine (9) lessons have been developed and validated by experts in the field using the lesson validation tool. The alignment of learning

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objectives to learning activities and learning assessments was assessed, and the following results were obtained: the learning objective has a mean score of 3.76 (highly observed), the learning activities received a mean score of 3.70 (highly observed), and the learning assessment received a mean score of 3.80 (highly observed), resulting in an overall mean of 3.77, interpreted as highly observed. A tool was also used to ensure the integration of the identified best practices into the developed lessons. Based on the expert's evaluation, all lessons developed garnered a mean score of 4.59, regarded as "highly integrated," which implies that the identified best practices were successfully integrated into the lessons developed.

The teacher's level of acceptability of the developed learning materials was gathered and analyzed from the evaluation of purposively selected ten (10) teachers teaching science subjects with the use of an adopted and modified acceptability test from a previous study. All nine (9) developed learning materials were evaluated and given a highly acceptable level of acceptance for the three (3) criteria, namely: content, usefulness, and design. Overall mean ratings were totaled for each criterion. Under the content criteria, all learning materials got a mean rating of 4.59 (highly acceptable), while on the usefulness criteria, all materials got a mean score of 4.60 (highly acceptable), and lastly, on the design criteria, the materials got an average score of 4.62 (highly acceptable). Thus, the teacher's level of acceptability of the developed learning materials, as evaluated by the experts, garnered an overall mean score of 4.61, interpreted as "highly acceptable." Furthermore, based on the results of the jurors' level of acceptability of the developed learning materials, it is also revealed that 80%, or 8 out of 10 teachers, said that the developed learning materials are "highly acceptable," and thus, 20%, or 2 out of 10 teachers, said that the developed learning materials are "moderately acceptable."

The acceptability of the developed lessons received exceptional feedback from the teachers who took the acceptability test. The acceptability of the developed lessons received exceptional feedback from the teachers; to be exact, 90% of teachers, or 9 out of 10, said that the developed

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ISSN: 2704-3010
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lessons are highly acceptable, while 10% of teachers, or 1 out of 10, said that the developed lessons are moderately acceptable. All nine developed lessons got a mean score of 4.55, which is interpreted as highly acceptable. This implies that the developed lessons are compliant with the DepEd's standard for developing lessons; thus, the lessons can be used by the teachers in delivering quality instruction.

The study concludes that programs that help safeguard the environment are among the identified best practices of sustainable and eco-friendly schools. As the school implements these practices, they serve as a model for what is appropriate and what learners should do in order to contribute to environmental stewardship and become responsible stewards. The identified best practices of sustainable and eco-friendly schools were successfully used as a foundation for the development of learning materials that can be used by teachers in teaching junior high school science. The jurors gave all nine (9) developed learning materials passing marks in terms of content, format, presentation, organization, accuracy, and up-to-datedness of information, recommending approval for public school use. The developed lessons using the developed learning materials were assessed by the experts and deemed very good. The alignment of the learning objectives, learning activities, and learning assessment were evaluated and assessed by the experts and garnered passing marks, recommending their approval to be used in teaching science lessons. The learning materials were highly acceptable based on their content, usefulness, and design, while the developed lessons were also highly acceptable based on their learning objectives, learning activities, and learning assessment.

The following actions are recommended: The best practices of sustainable and eco-friendly schools that have been identified must be thoroughly examined, evaluated, and presented in the form of a school handbook. It is highly recommended to develop a school handbook about the best practices to assist schools, teachers, and other organizations on how to adopt and which environmental programs to implement; the developed learning materials can be adapted to

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ISSN: 2704-3010
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improve the dissemination of information about the identified best practices of sustainable and environmentally friendly schools, which can be done by many schools. It can also be utilized as a direct instructional tool in teaching junior high school science. Furthermore, the developed learning materials, which are based on identified best practices in sustainable and eco-friendly schools, are highly recommended for implementation to see if they are beneficial in instilling a love of nature in learners and increasing their environmental literacy; science teachers teaching science subjects may apply and adopt the developed lessons using the learning materials in which the identified best practices for sustainable and eco-friendly schools have been integrated. Teachers may also modify any of the features of the lessons, bringing better implications for their students' learning; and the level of acceptability for the developed learning materials can also be gathered from the students, which is significant as they will be the ones to use the materials. Likewise, the teachers who determined the level of acceptability of the developed lessons may come from various divisions under the Department of Education and other interested institutions who view that there is a need to integrate environmental initiatives in today's education.

Keywords: *best practices, climate change adaptation, challenges, eco-friendly schools, sustainable development*

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
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INTRODUCTION

Mother Earth is on the verge of a major environmental disaster. People are prone to disasters and tragedies as a result of current environmental challenges, both now and in the future. Environmental problems are stacking up all around us in today's era, which is in a state of planetary emergency. Men will be doomed to disaster unless the various issues are dealt with carefully and seriously. The current state of the ecosystem necessitates immediate care.

Fortunately, the Department of Environment and Natural Resources' Environmental Management Bureau (DENR-EMB) organized a search for a sustainable and eco-friendly school in collaboration with the Department of Education (DepEd), the Commission on Higher Education (CHED), Nestle Philippines, and Landbank of the Philippines. They urged schools and academic institutions to become more involved in practical and local environmental issues. Through this initiative, more teachers and students will be actively involved in raising environmental consciousness. Additionally, this encourages learners to become more involved in resolving environmental issues in their local communities by fostering their critical and creative thinking abilities.

Furthermore, the promotion of this program for the establishment and strengthening of sustainable and eco-friendly schools in the country was enshrined as a priority in the ASEAN Environment Year 2015 as well as in the road map for the implementation of Republic Act No. 9512, also known as the National Environmental Awareness and Education Act of 2008, under the National Environmental Education Action Plan for South-eastern Asia (2009-2014). Being guided by these provisions provides the learners with the foundations they need to live a sustainable and eco-friendly life. This also increases their understanding of why the environment is essential. Additionally, this will support the learners' efforts to develop an understanding of the environment at home and inspire the broader community to adopt similar practices.

Talking about those legal bases to promote environmental awareness and protection

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ISSN: 2704-3010
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within the educational institutions, the National Search for Sustainable and Eco- friendly Schools seeks to honor educational institutions that have the most sustainable and eco-friendly programs and activities. Environmentally friendly schools are those that have initiated and integrated environmental-related initiatives within their teaching, research, extension, and/or administration. The competition aims to encourage students, teachers, and school administrators to adopt behavioral solutions to combat climate change and other environmental issues, as well as to generate active actions and increase community knowledge and engagement on environmental issues.

The search recognized three special category leadership awards, namely: The Nestle Water Leadership Award, which recognizes and promotes school-based water management and conservation solutions, practices, and initiatives; The Energy Leadership Award, which focuses on energy efficiency and conservation embedded in school activities; and The Landbank Green Leadership Award, which will be given to the three national first prize winners per category. Schools who have successfully submitted their entries will be assessed by the committee in charge of each entry. For national judging, the top entries in each category from each region will be sent to the EMB Central Office in Quezon City.

In that way, the Department of Education (DepEd) memorandum series number 195 of 2016 has been issued. It encourages private and public schools at the elementary and secondary levels to participate in the contest and be a part of the community that has the best practices to battle climate change. By participating in the contest, the school is committed to implementing and showcasing their best practices in order to be classified as a sustainable and environmentally friendly school. Teachers, staff, and even students are immersed in activities that promote environmental protection and mitigate the effects of climate change.

Due to this, the Department of Education hopes to enhance climate change awareness in basic education. The Department of Education is working to strengthen the integration of climate change education into the curriculum in order to increase the number of climate-literate students

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
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and teachers in the country. Similarly, school and community- based research should be supported and considered when planning for climate change adaptation and mitigation.

From the notion that the education department hopes to hone learners and teachers who are climate literate and proactive in supporting resilient and sustainable schools, the department wants to enhance climate literacy and encourage climate action in the basic education sector. It is believed that the most effective way to increase environmental literacy among students is to employ learning materials that focus on climate change awareness. Thus, the development of learning materials that incorporate climate change competencies is progressing and being given adequate time. There is a need to support teachers and other educators in developing additional environmental education learning materials.

Thus, based on the idea derived from the search for sustainable and eco-friendly schools, the best practices of sustainable and eco-friendly schools were used as a basis to develop learning materials for climate change adaptations, environmental protection and conservation, disaster risk reduction, and sustainable development. Those learning materials were designed for teaching junior high school science. The researcher strongly believes that learners, teachers, and school leaders all have a role to play in tackling environmental concerns. Teachers who can integrate teaching in the real world and who understand the effects of climate change on individuals and communities are critical in schools.

In fact, one of the most important factors that must be present in order to conduct teaching and learning activities is the use of learning materials (Harsono, 2015). The learning materials developed in this study were based on the best practices for sustainable and eco-friendly schools, and they have a significant impact on students' learning and behavior because the use of learning materials is critical to making lessons exciting, learning easy, and allowing teachers to clearly communicate topics. This also implies that when developing learning materials, the specific aim must be taken into account.

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Moreover, Students' environmental literacy can be increased by developing locally developed learning materials based on local best practices or solutions to local environmental challenges. In fact, according to a study by Suriawati (2020), using the Local Environmental Problem-Based Learning Student Worksheets to Strengthen Environmental Literacy is an excellent strategy to increase students' environmental literacy. This simply means that teachers and other educators should employ environmental education-focused learning materials and continue to develop more timely and relevant instructional tools.

Likewise, according to Mayor (2015), educational institutions should prioritize practices and the development of instructional materials that support environmental proficiency development. He also emphasized the importance of teachers and students being more responsive with their curricular activities, adhering to the notion that learning is more than just knowledge. The utilization of learning materials in the classroom is one technique to effectively instill concepts of environmental consciousness among students. As a result, developing learning resources that incorporate local environmental challenges and solutions is the ideal method to promote both teachers' and students' environmental literacy.

It has also been proven that using integrated science teaching materials improves students' environmental literacy (Suryanti et al., 2018). They discovered that students' knowledge, competencies, emotions, and environmentally responsible behavior improved when they used the developed learning materials. This also supports the idea that developing learning materials focusing on environmental challenges and solutions is necessary and should be provided in a variety of ways, like print and non-print. Knowledge and a sense of responsibility can be successfully imparted in this manner.

As a result, teachers and other educators are in high demand to supplement more locally developed environmental learning materials. A set of teaching resources aimed at introducing

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ISSN: 2704-3010
Volume V, Issue IV
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students to environmental issues, with a focus on local issues, should be designed. It has been demonstrated that having effective learning tools helps students learn more and become more climate resilient. Thus, more teachers can develop learners who have a strong sense of responsibility for environmental protection.

MATERIALS AND METHODS

Research Design

The study employed a descriptive-developmental research design, in which the particular situation was carefully investigated, described, and analyzed, serving as the basis for the development of the final result. Such situations are the best practices implemented by the schools that have been recognized and awarded for being sustainable and eco-friendly. The school's best practices have been researched, documented and analyzed to establish facts, develop learning materials and lessons from them, analyze its level of acceptability, and draw conclusions.

Furthermore, a descriptive-developmental research design was used in the hopes of obtaining useful information about the outcomes (Cresswell, 2008). The involvement of qualitative data helps legitimizes the use of such data. It also offers a type of mixed- methods design in which the researcher can collect qualitative data while the overall design still favors quantitative approaches. More so, to obtain methodologically valid data, both procedures are required. Silva (2017) claims that educational research cannot disregard the frameworks that outline and contribute to the quantitative and qualitative approaches in the approximation of the study object, which are becoming increasingly important. What distinguishes research from science is how data is used to support claims. In this research study, both methods have been used to establish strong and methodologically sound data.

In this research study, the descriptive-developmental research design was utilized since one of the main goals of the study was to identify the best practices of sustainable and eco-

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ISSN: 2704-3010
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friendly schools through documentary analysis. The designed survey instrument was utilized to collect relevant data, such as the best practices, how they are implemented, challenges and difficulties encountered during implementations, project analysis, funding requirements, and photo documentation. The best practices were presented and discussed thoroughly since they became the basis for the development of learning materials and lessons. Hence, from the identified best practices of sustainable and eco- friendly schools, the researcher developed learning materials and lessons that can be used in teaching junior high school science in which the identified best practices were used. After the development of the materials and lessons, the experts were tapped to validate their content. Furthermore, the results of the juror validation using the tools for the developed learning materials and lessons were also used, specifically the juror's evaluations, comments, suggestions, and recommendations.

Conversely, the quantitative approach was employed through the results of juror's validations. The developed learning materials and lessons have been validated by the experts using the Learning Resource Management and Development System (LRMDS) tool and lesson validation tool to validate their contents and suggest improvements. The teachers' level of acceptability tool was also utilized, and the numerical rating given by the experts was used to strengthen the results of the study. To delve further, the weighted mean was used to statistically treat the data collected from the juror's evaluation. This was employed to establish and describe the collective experts' evaluation for data analysis and interpretation. The researcher employed this to determine the expert's validation of the developed learning materials and lessons. Then, on the teacher's level of acceptability of the developed learning materials and lessons, a ratio and proportion in a form of percentage were used. The mean percentage was used to appropriately establish the teachers' level of acceptability of the developed learning materials and lessons.

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ISSN: 2704-3010
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1. Sources of Data

The following are the sources of data that have been used to present the findings of the study: teacher-in-charge of the implementation of the school's best practices; documents submitted by the schools to the DENR-EMB office; the Department of Education's Science Curriculum Guide; teacher's evaluation of the lesson using the validation tool; and evaluation of the teachers' level of acceptability of the developed learning materials and lessons.

To delve further, the primary sources of data in this study were from the twelve schools in the Bicol Region that received awards and recognition from the Department of Environment and Natural Resources—Educational Management Bureau (DENR-EMB) during the search for sustainable and eco-friendly schools in the years 2009, 2011, 2013, 2015, 2017, and 2019. They have been chosen carefully and awarded as they meet the criteria and mechanics set by the DENR-EMB in relation to the said competition. Each school has been visited by the researcher, who successfully collected data based on the teacher evaluation using the developed interview guide. Such data was obtained from the school's leaders, committee team, and person in charge of the implementation of the best practices for sustainable and eco-friendly schools. They have been interviewed and have successfully captured all the relevant data in line with the search's best practices. Secondary data was also used, which are the documents submitted to the DENR-EMB office by the participating schools as part of their qualifications to participate in the search for sustainable and eco-friendly schools. The researcher requested the documents from the office and thoroughly evaluated them.

Following the identification of the best practices, these have been used as the basis for the development of learning materials. With the use of the DepEd's curriculum guide, the identified best practices were matched to the learning competencies in junior high school science to be used in the development of materials. Upon the development of learning materials, the terms and other photographs used by the school for their best practices shown in the documents submitted to the DENR office were utilized, securing the consent of the concerned schools. Thus,

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the other source of data for this study is the results of the validation of the developed learning materials as assessed by ten experts in the field of science using the LRMDS tool for content improvement. The experts were asked to rate the developed learning materials following the given tools, and their comments and suggestions were also solicited and used for presentation as part of the study's findings. This study also employs the data acquired using the tool to ensure that the identified best practices have been integrated into the developed learning materials and lessons.

Then, the researcher used the developed learning materials to successfully develop lessons. The lessons have been validated by the ten (10) jurors using the lesson validation tool. Following validation, the lessons were revised in accordance with the experts' suggestions and recommendations. The same experts were then asked to evaluate the lessons using the tool to ensure that the identified best practices for sustainable and eco-friendly schools had been integrated. The results of the validation of the lessons also yielded significant data for the study

In addition, the level of the acceptability of the purposively selected ten science teachers teaching science subject in the public schools of the department of education specifically in the Albay Division were also considered as necessary data which were gathered from the study. The data that has been used to present the teacher's level of acceptability of the developed learning materials and lessons also came from the ten experts who persistently analyzed and evaluated the developed learning materials and lessons. These same experts were humbly asked to validate their content and offer suggestions for improvement. The tools used to determine the level of acceptability of the developed learning materials and lessons were based on the adapted and modified tools from previous research. Google Forms was used to send the tool to the experts through email. The researcher successfully generated data and presented the findings using the level of acceptability tool.

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2. Respondents

The following are the respondents to the study for which methodologically sound data were sourced:

The school leaders, committee members, and those in charge of the implementation of the best practices from the twelve schools that have been recognized as sustainable and eco-friendly schools by the DENR-EMB in the Bicol region were served as the respondents to gather data about the schools' best practices as sustainable and eco-friendly schools using the developed interview guide. There are sixty (60) schools in the region that have joined the said search from years 2009, 2011, 2013, 2015, 2017, and 2019, but only the twelve (12) schools awarded as first, second, and third placers during the search and as a result of the rigorous and scientific process of evaluating the best practices of the schools using the set criteria were considered as a sample size for the study. Furthermore, these individuals are the most knowledgeable and aware of the difficulties encountered when putting the best practices into effect, both inside and outside of the school. They are crucial for obtaining all the information necessary to respond to the developed survey questionnaire and capture all relevant data. Furthermore, they are the school's teaching and non-teaching forces as well as the key individuals for successfully gathering methodologically sound data. Known as the leaders, they prepared the relevant documents in accordance with the search conducted by the DENR-EMB.

The jurors. Following the identification of the best practices for sustainable and eco-friendly schools, the researcher developed learning materials to be used in teaching junior high school science. The content of the developed learning materials has to be validated by the experts; thus, the other respondents to the study are the ten experts in the fields of biology, science, research, and grammar. Said experts were teachers from the Department of Education, specifically in the Division of Albay. Moreover, said validators hold a Master's Degree and have been employed in the teaching profession for almost 2 to 3 years, while others have spent 10

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years or more teaching science subjects. They are also experts in the field of biology, have experience writing research papers, and have published research studies, which qualifies them to serve as validators of the study. They played a significant role in this research study since they assisted in assessing, evaluating, and improving the developed learning materials. Recommendations and suggestions to improve the developed learning materials were solicited from them in order to qualify and meet the standards of the Department of Education. They carefully reviewed the developed learning materials for potential improvements and evaluated them in order to successfully generate the data needed for the research problem to be solved.

Then, from the developed learning materials, lessons were developed. The same jurors who validated the developed learning materials were tapped to serve as the validators of the developed lessons. Likewise, the same jurors also served as validators to assess if the identified best practices had been integrated into the lessons developed using the tool. The result of the jurors' validation of the developed lessons was used to present the study's findings, specifically their comments, suggestions, and recommendations.

Science Teachers. After the development and validation of learning materials and lessons, the teachers' level of acceptability of the developed learning materials and lessons was determined using the acceptability tools. There were ten (10) science teachers who persistently evaluated the developed learning materials and lessons. Said science teachers have a master's degree, have been employed and practicing teaching for almost three to ten years in public schools in the education department, specifically in the Albay Division, and have experience doing research. The results of their evaluation, comments, suggestions, and recommendations became the foundation for making the materials and lessons interesting, effective, and aligned with the standards of the education department.

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Instrument validators. There are also five experts who have validated the developed interview guide to make it effective in gathering the necessary data. These experts are four females and one male. They work as science teachers, grammar experts, and research directors in an educational institution. They have been purposefully selected to help the interview guide become more effective, and the art of questioning follows a systematic and orderly manner of inquiry.

INSTRUMENTS

The researcher employed the following research instruments in order to successfully obtain the research objectives:

A. Interview Guide for Sustainable and Eco-Friendly Schools' Best Practices (see Appendix F on page 322). This tool was developed by the researcher to capture all of the necessary information pertaining to the school's best practices for sustainability and eco-friendliness that have been implemented. This step is vital to the research study since it will serve as the foundation for the development of instructional materials and lessons that can be used by the teachers in teaching junior high school science. The part I of this tool is intended to collect personal data about the in-charge and implementers of the best practices and other school information, such as its name, address, year of joining the contest, and so forth. Part II included the survey questionnaires and other essential questions that would capture all of the school's best practices and challenges met during the implementation. This interview guide has been validated by five experts in order to improve its content, specifically the art of questioning to successfully capture the data needed to satisfactorily answer the research questions. Upon validation, the researcher has explained thoroughly to the validators the aim of this interview guide to be successfully crafted and capture the data needed. This tool was also used by the researcher during his visit to the various schools in the Bicol Region.

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B. Expert Learning Resource Management and Development System (LRMDS) Assessment and Evaluation Rating Sheet for PRINT resources (see Appendix G on page 325). This tool is from the Department of Education, which uses them to validate learning resources that have been developed in order to provide quality and accessible education. These were utilized to validate the learning materials that had been developed. There were two parts. Part I was designed to collect personal information such as the evaluator's name, area of expertise, school where he or she teaches, position title, and educational attainment. Part II consists of a series of questions designed to assess the effectiveness of the developed learning materials. This tool confirms the efficacy of the previously developed learning materials, which used a Likert-type scale. The highest number on the scale is 4, which means very satisfactory, and the lowest number is 1, which means not satisfactory. In the tool, there were also spaces for jurors' comments and suggestions. The scores given by the experts' responses were calculated, and the data was interpreted as a result. These tools will also indicate that certain learning materials can be used for public use once they garner passing marks from the validators.

C. Lesson Validation Tool (see Appendix H on page 329). This tool was used by the jurors to determine whether the lessons have met the expectations. The evaluation tool was adapted from Orolfo (2019) in which she developed the tool for her research study. Said tools were validated by an expert and have been used by the jurors in the past research. The part I of this tool intended to collect a juror's profile such as name, field of expertise, school, position, years in service, and educational attainment. Part II is the lesson validation criteria. It is divided into three (3) components namely, learning objectives, learning activities, and learning assessment. Juror's comments and suggestions have been also provided at the lower portion of the instrument. In this study, this tool was used by the same validators who have validated the developed learning materials.

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D. *A Tool to Ensure the Integration of Best Practices into the Developed Learning Materials and Lessons (see Appendix K on page 337) .* This tool was adapted and modified from the study of Guemo (2019) and Orolfo (2020). Some modifications were made to the teachers' level of acceptability tool developed by Guemo and the lesson validation tool developed by Orolfo to fit in the current study specifically on the indicators to easily assess by the jurors the integration of the identified best practices into the developed learning materials and lessons. Furthermore, this tool serves as a guide to the researcher on how to properly integrate the identified best practices of sustainable and eco-friendly schools into the developed learning materials and lessons. It is divided into three parts. Part I aims to collect the basic profiles of the jurors, which include their name, age, educational attainment, school where they work, position, and number of years in teaching. Part II contains the criteria to determine the integration of the identified best practices into the developed learning materials. There are ten criteria provided and a four-point Likert scale in which 4 is the highest (highly integrated) and 1 is the lowest (not integrated) were used. Part III also contains the criteria to ensure the integration of identified best practices into the developed lessons. It is also a four-point Likert scale in which 4 is the highest (highly integrated) and 1 is the lowest (not integrated). This tool was validated by five experts, including a grammar expert, a research director, and science teachers, to ensure its validity.

E. *Teacher's level of acceptability tool for developed learning materials (see Appendix I on page 332).* This tool was adapted from Guemo (2019) as part of her study about "Lessons Using Illustrated Instructional Materials in Grade 7 Biology" in her master's thesis. This tool has been validated by an expert and was used in several studies that determine the teachers' level of acceptability of the materials using the science teachers as evaluators. In this study, this tool was used to assess the teacher's level of acceptability of the developed learning materials in which the best practices of sustainable and eco- friendly schools were integrated and used as a foundation

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for the development. This tool has three criteria: (a) content, which has five elements that focus on the overall content of the learning materials; (b) usefulness, this criterion emphasizes the applicability, usability, and appropriateness of the developed learning materials; and (c) design: the criterion emphasizes the appropriateness of the images used, the use of simple letters and language, and the design of the learning materials.

F. *Expert evaluation sheets on the acceptability of the developed lessons (see Appendix J on page 334).* This tool was used to assess the teachers' level of acceptability of the developed lessons. This instrument was adapted and modified from Orolfo's (2020) unpublished master's thesis, in which she utilized it to evaluate the developed lessons. However, some modifications were made to fit in the current study in which the identified best practices of sustainable and eco-friendly schools were used and integrated. The first half of this tool is intended to collect the profiles of the science teachers, and the second part is the indicators for lesson validation, which includes assessing and evaluating the alignment of the learning objectives with the learning activities and learning assessment. A total of ten biology experts and an English teacher validated and assessed the lessons that were developed. The developed learning materials are used in nine lessons and the education department's curriculum guide was used in developing the lessons.

3. STATISTICAL TREATMENT OF THE DATA

The following are the statistical tools that the researcher opted to use in analyzing and interpreting the data collected in the study:

Weighted mean. This statistical instrument was employed to establish and describe the collective experts' evaluation for data analysis and interpretation. The researcher employed this

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to determine the expert's validation of the developed learning materials and lessons.

Ratio and Proportion. This was used to effectively present data on the teacher's level of acceptability of the developed learning materials and lessons. Based on the results of the teacher's evaluation on the developed learning materials and lessons, weighted mean was used and interpreted individually. Then, ratio and proportion were used in a form of percentage to present the teacher's level of acceptability.

RESULTS AND DISCUSSION

Best Practices of Sustainable and Eco-Friendly Schools

Many people in today's generation do not care as much about the environment they live in. It is because people do not fully comprehend what is going on and do not know how to deal with the issues that they have found in their environment. As a result, many people are experiencing the effects of climate change, including high temperatures, severe typhoons, and even the introduction of several virus-related diseases. It is important that everyone learn how to take good care of the environment. These actions are crucial in that they encourage critical and creative thinking while providing opportunities for individuals to become more involved in their communities.

The inculcation of environmental concepts and the development of individuals with a high sense of environmental awareness start in school. Teachers play important roles in honing students' skills to become responsible stewards of nature. Introducing environmental practices to the students is a great move in order for them to perceive the importance of being

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environmentally literate. In fact, the Department of Environment and Natural Resources' Educational Management Bureau (DENR-EMB) has organized a search for sustainable and eco-friendly schools, through which they were able to identify the schools performing the best practices to mitigate the effects of climate change. Through the excellent initiative of the DENR-EMB, the researcher decided to undertake a study gathering the best practices employed by the recognized and awarded schools as sustainable and eco-friendly. The identification of the environmental best practices used by the schools has served as the basis for the development of learning materials that science teachers can utilize in teaching junior high school science. Said best practices were featured in the developed learning materials and lessons to successfully introduce to the learner's real-world solutions to environmental issues. The following sections provide a detailed explanation of this research study.

The Environmental Management Bureau of the Department of Environment and Natural Resources (DENR-EMB), the Department of Education (DepEd), the Commission on Higher Education (CHED), and Smart Communications Inc. collaborated to establish the National Search for Sustainable and Eco-Friendly Schools in 2009. In the Road Map for the Implementation of Republic Act No. 9512, also known as the National Environmental Awareness and Education Act of 2008, and the National Environmental Education Action Plan for Sustainable Development, the promotion of this program for the establishment and/or strengthening of sustainable and eco-friendly schools in the nation has been enshrined as a priority.

The primary goals of the Search for Sustainable and Eco-Friendly Schools are to encourage academic institutions and schools to take a more active role in addressing environmental issues at the local and practical level; to develop understanding and skills among students, faculty, and school administrators in launching active responses; and to raise community awareness and involvement in environmental issues. Additionally, according to the DENR-EMB, sustainable and eco-friendly schools can be characterized as eco-friendly schools that have initiated and

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integrated environmental programs into their curriculum, research, extension, and/or administration.

The basis and other parameters for selecting and awarding the best practices of sustainable and eco-friendly schools have been jointly developed by the Environmental Management Bureau of the Department of Environment and Natural Resources, the Department of Education, the Commission on Higher Education, and some civil society and private sector groups. The following are the criteria for determining the level of sustainability of the schools: Clear articulation and integration of social, ethical, environmental and climate change dimensions in the institution's vision, mission and governance; Environment and Climate Change Dimensions in School Operations; Environment and Climate Change-related Features of the School Curriculum; Presence of Vibrant Eco Organizations in Campus; Presence of Environmental Partners and Linkages in Various Programs, Projects and Activities; and Socio-Cultural and Economic Sustainability. The DENR-EMB has also suggested best practices that can be adapted by the schools in pursuit of sustainable and eco-friendly schools, such as developing environmental policies for the school; physical cleanliness, orderliness, and beautification of the school; energy conservation and efficiency; reforestation and/or nursery establishment; establishment of a botanical garden; and the like.

Thus, from the criteria set by the DENR-EMB in selecting sustainable and eco- friendly schools, they have successfully identified schools that are eco-friendly and have given them recognition and awards. As defined by the DENR, eco-friendly schools are those that have initiated and integrated environmental-related initiatives within their teaching, research, extension, and/or administration. This became the basis for the researcher to identify schools as the chosen locale and conduct research specifically on collecting the best practices they have implemented in accordance with the search. These best practices are programs and projects implemented in schools that have a great impact on conserving and protecting the environment.

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Furthermore, said best practices are common to all schools that have been awarded, as they are following the mechanics and criteria provided by the DENR. However, there are also other environmental practices that are unique to every school and have been effective in improving the condition of the environment. These best practices are deemed sustainable and practical since they do not necessitate large funding requirements and can be sustained by the students, teachers, and school administrators, which makes them recognized as sustainable and eco-friendly schools.

Then, following the mechanics, one regional finalist will be chosen for the award and compete at the national level. The school that advanced to the national level of competition has received accolades like the Nestle Water Leadership Award, Meralco Energy Leadership Award, and LANDBANK Green Leadership Award. Moreover, schools that participated at the regional level have been recognized by the DENR-EMB as sustainable and eco-friendly schools by recognizing them as first place, second place, and third place. Respectfully, this research study used schools that had won awards from first through third place at a regional level to gather, analyze, and document their best practices. The development of learning materials for teaching junior high school biology is based on the best practices that have been implemented.

From sixty schools that have joined the contest, twelve schools were recognized by the DENR-EMB in Region V-Bicol after elimination as being the most environmentally friendly and sustainable schools in the years 2009, 2011, 2013, 2015, 2017, and 2019. In fact, they were recognized with first, second, and third place awards. Camarines Sur National High School won first place in 2009 and 2011; San Felipe National High School came in second place in 2019; Camarines Norte National High School came in third place in 2015; Ocampo National High School came in third place in the years 2009 to 2011; Magallanes National High School came in first place in 2013 and third place in 2015; Bulusan National High School came in second place in 2009; Tiwi-Agro Industrial School came second place in 2015 and first place in both 2017 and

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2019; Naga High School came in second place in 2013 and first place in 2015; Tabaco National High School came in third place in 2013; Polangui Comprehensive High School came in third place in 2019; Bariw National high School came second place in 2017; and Sunshine International School came in second place in 2011.

As mentioned above, the schools in the Bicol region that have received awards from the DENR-EMB actively engaged in the search because they believed that information is a major component of education and a continuous campaign for massive environmental awareness is indeed necessary. Since climate change is becoming more severe and adamant, they hold green activities and fairs, educate learners about the need for environmental awareness, and implement conservation programs in the classroom. Many individuals believe that teaching learners to be effective environmental stewards and to have a strong sense of environmental literacy begins in the classroom. By joining the search, both teachers and students will engage in a relationship of working together to address environmental problems by implementing the best practices in the classroom and on campus using the guide provided by the DENR.

The best practices of sustainable and eco-friendly schools are given in this section, and they serve as the foundation for the development of learning materials for teaching junior high school biology. The identified best practices for sustainable and eco-friendly schools were classified into climate change adaptation, disaster risk reduction, environmental protection and conservation, and sustainable development. Schools can use the following best practices to enhance environmental awareness among students and teachers:

a. ***Climate Change Adaptation.*** Adapting to life in a changing environment entails adjusting the current or predicted future climate. The idea is to make people less vulnerable to the negative effects of climate change, like sea-level encroachment, more intense extreme weather events, or food insecurity. It also includes taking advantage of any potential benefits

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linked to climate change. In a classroom setting, a student must be taught how the environment changes over time. This only means that it can be achieved by giving the students instruction that focuses on how climate affects everything on earth. Changes that may affect the life of every human being as well as the life in an ecosystem, effects on agriculture sectors, and the balance of all forces that are vital for the development and needs of every living organism.

Education can have a significant impact on students' everyday habits and decision- making that lowers their overall lifetime carbon footprint by fostering in them a strong personal connection to climate solutions as well as a sense of personal responsibility and empowerment. As soon as students enter school, climate action must be taught and instilled in their minds so that they can act responsibly and support the struggle to reverse the effects of climate change. Teachers, students, and school administrators will all participate in the endeavor to solve environmental challenges by adopting climate change activities in the classroom and school campus. In fact, as stated in the presented studies, climate change issues and concepts are being studied by the students in all Italian schools (Mezzofiore, 2019). This is an article that strongly supports the idea that climate change education must be strictly introduced to young learners in order for them to have a strong foundation in environmental awareness. In many schools, teachers inculcate environmental themes among their learners with the help of learning materials, particularly about climate change, and effective lesson planning. The study of Ameliawati et al. in 2021 and the development of worksheets on climate change issues made the learners ready for all challenges to effectively address the problems.

In this research study, one of the goals is to develop learning materials and lessons that can be used by teachers in teaching junior high school science. The best practices that have been identified under climate change adaptation were used as a basis for developing learning materials. These practices are the programs and projects that have been implemented by the schools in line with the DENR's search for sustainable and eco- friendly schools. For example, the establishment

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of botanical gardens, plant nurseries, and reforestation are practices that help promote environmental protection and conservation. These activities show that individuals are adapting to their environment and mitigating the effects of climate change. Moreover, in this section, said best practices were thoroughly explained and provided with photo documentation.

Schools that have received DENR-EMB recognition for being sustainable and ecologically friendly are actively implementing the best practices for climate change adaptation. Said best practices were recognized by the DENR-EMB using the criteria they have set, which helps promote improving the condition of the environment and encourages students to become more actively involved in solving environmental issues at a practical and local level. These best practices have been considered in the development of learning materials to help address learning competencies and have been integrated to promote environmental awareness among learners. Such examples are reforestation and the establishment of botanical gardens. The teachers allocate considerable time to environmental education and fun activities such as tree planting during their in-service training. Furthermore, the teachers incorporate environmental themes into their lessons to successfully instill the importance of adjusting to the challenging environment in the minds of the students. Environmental clubs and organizations, such as YES-O and the Science Club, are also present in schools. Many schools also hold community outreach events, green fairs, and green product sales. Thus, these best practices were used and successfully integrated into the developed learning materials in the hopes that, through the integration of these practices, teachers can successfully produce learners with a strong sense of environmental awareness and increase their level of environmental literacy.

The DENR-EMB highly recommends the aforementioned best practices and efforts on sustainable and eco-friendly schools, which can be modified, adjusted and improved by the schools for better results and are an effective means to support the right addressing of environmental challenges. Table 1 summarizes the best practices identified in the context of

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climate change adaptation.

Table 1 Climate change adaptation best practices

Best Practice	Description
Reforestation and/or Nursery Establishment	On school campuses, plant nurseries have been successfully installed for campus beautification as well as an efficient method for reducing pollution and producing clean air. The following are some of the practices done by the schools: For the purpose of tree planting activities, some seedlings are given for free in the neighboring community. Other schools have collected seedlings from the donations of the stakeholders and other agencies. Teachers and students were actively participating in reforestation via tree planting. The schools that are implementing this initiative are Tiwi-Agro Industrial School, Sunshine International School, Bulusan and Magallanes National High Schools in Sorsogon, and Camarines Sur and Camarines Norte National High Schools.

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Establishment of Botanical Garden	It is a garden dedicated to the collecting, cultivation, preservation, and display of a diverse range of plants. According to the school director of Sunshine International School, the botanical garden is a long-term school initiative because both the school administration and the parents of the learners are eager to collaborate and provide funds for its upkeep. Schools that are implementing this initiative are Camarines Sur National High School, Magallanes Vocational High School, tiwi-Agro Industrial School, and Sunshine International School
Integration of Environmental Themes into the School Curriculum	The schools include activities related to environmental conservation throughout the curriculum, not merely in science classes. They also included environmental activities in a variety of school programs, both inside and outside the school. This initiative is being implemented in the 12 schools that have been visited.
Presence of Environmental Clubs and Organizations	School organizations like Science Club and YES-O encourage students to participate in and carry out important environmental actions and initiatives. Furthermore, the YES-O club is the only one that meets monthly for activities that focus on environmental protection, conservation, and sustainable development. Other school clubs, like the English and Arts, were also incorporating environmental initiatives into

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	their lessons and culmination activities. This initiative is present in all 12 schools that have been visited.
Conduct of In-service Environmental Training for Faculty Members	The organization's level of competence in the environment will be enhanced by environmental training. Teachers and employees will have a better awareness of the school's environmental regulatory concerns, helping schools to become more environmentally friendly and sustainable. One of the most effective ways to provide more understanding and produce environmentally literate learners is to train the teachers in environmental literacy. This best practice is present and being implemented by the 12 schools visited by the researcher.
Environmental education and community outreach, green fairs and environmental exhibits, or the sale of green products, seminars, conferences, or symposia, eco-tours or ecological destinations, and healthy lifestyle campaigns	Many schools have taken part in this effort, which has proven to be quite helpful in raising environmental awareness and supporting sustainable development. The YES-O club and other school organizations encourage the sale of green items such as handicrafts, locally grown fruits and vegetables in schools, and so on. During science month celebrations, clubs fund environmental literacy seminars and training, as well as other culminating activities. These programs and initiatives are being implemented by the 12 schools that have been visited.

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b. Disaster Risk Reduction. Dealing with disasters has traditionally centered on emergency response, but as time goes on, it has become evident that disasters are not natural and that the only way to avoid losses and lessen disaster impacts is to decrease and manage hazards, exposure, and vulnerability. Natural catastrophes are unavoidably severe; therefore, the greatest strategy to mitigate risk is to restrict sensitivity and exposure. Disaster preparedness and response actions are included in disaster risk management, but it is much more than that. Therefore, one must be taught the value of being ready, prepared, and alert in order to successfully lower the risk of a natural catastrophe among many people. One of the best methods to instill the value of safety at all times in students' minds is to teach them the notion of disaster risk. The concept of disaster risk reduction is an important one that students should grasp thoroughly in school. If the school successfully introduces DRR to its students, a bandwagon effect of always being prepared will occur. The students can pass on their knowledge to their family, neighbors, and community. The conduct of quarterly earthquake drills is the most common DRR practice done in schools. Other safety measures, such as delivering first aid and the like, are rarely implemented due to a lack of training.

Schools can play a significant role in taking action to foster a culture of resilience among students. Based on the standards established by the DENR-EMB, the existence of disaster risk reduction themes in the curriculum and best practices for disaster risk reduction programs are the requirements for determining if a school is prepared for unanticipated natural disasters. Schools are strongly encouraged to submit their own disaster risk reduction measures that can be modified by the schools to foster a strong sense of resilience among students. It was Petal (2008) who stated that risk reduction has been an urgent and fundamental necessity of public awareness and education for decades. Thus, risk reduction education materials and processes should be prioritized to achieve the goal of informing the students and adults in the community, and as a result, they will be better prepared. In this research study, the disaster risk reduction

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school's best practices have been collected and used as featured content in the developed learning materials.

Furthermore, the best practices on disaster risk reduction done by the schools that have been recognized by the DENR are effective means to introduce to the students and teachers the importance of resiliency. The presence of climate change and disaster risk reduction programs is also evident in all schools that have been awarded as sustainable and eco-friendly. As mentioned above, schools play an important role in instilling in students' minds the concept of resilience. Thus, learners are trained to be more ready in times of disaster, which in turn can be passed on to their families and even outside the community. Through these best practices, the concepts of disaster risk reduction can be successfully comprehended by the learners with the use of other environmental support learning materials. Listed below in Table 2 are some of the top disaster risk reduction practices that can be done in schools.

Table 2 A summary of the identified disaster risk reduction best practices

Best Practice	Description
A maintenance culture ensures that all school buildings and their equivalents are kept in good repair and in good condition.	The ability of students to study well in schools is dependent on the school's safety. As part of their coursework, senior high school students usually perform school building assessments. They are creating reports based on their assessment that require repair and maintenance initiatives following their complete assessment. By doing so, a culture of environmental safety will be fostered. All of the schools that have been visited have a maintenance culture within the organization to ensure students' safety and productive learning.

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Awareness Raising Program: Informing people about their risk	This initiative intends to provide teaching and guidance on family earthquake preparedness to all DepEd-recognized schools. A poster contest, a fair at a local mall, or a program on one of the nearby town's radio or television stations are all examples of this type of endeavor. The schools where this program is being implemented are Naga High School, Tiwi-Agro Industrial School, Magallanes Vocational High School, and Camarines Sur National High School.
Developing DRR learning and training materials	DRR learning and training resources are being developed by every school as part of the requirement. The development of interactive teaching and training materials has become a strong point in DRR development, and the lessons learned by learners can be used to share and instruct others. Educators are using this project to create secondary school textbooks; conduct training such as summer camps; and create posters, computer presentations, and pocketbooks for millennial learners. The schools that have successfully produced DRR training materials and lesson plans include Tabaco National High School, Tiwi-Agro Industrial School, Magallanes Vocational High School, and Camarines Sur National High School. In other schools, DRR themes have been effectively integrated into the curriculum.

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Using Multimedia to Raise Awareness and Build Resilience	The media and other kinds of communication play a vital role in disseminating knowledge and information about DRR throughout the country. Examples are earthquake preparedness films and Tiktok video clips about disaster preparedness that can be uploaded to Facebook, Instagram, and Twitter, which can be extremely useful in spreading disaster preparedness information. All of the schools that have been visited take advantage of the opportunity to create multimedia in order to raise awareness and foster resilience, not only for their students but also, of course, for the community, as social media's power is rapidly growing and cannot be surpassed to be used by the students.
Youth Participation in Disaster Risk Reduction	This initiative is done through student councils. This program encourages youth participation. The student council, for example, focused on an abandoned construction site near the school. The site was dangerous, and the learners should analyze it in order to provide recommendations for rehabilitation and improved safety that they can use in their own homes and at school. The students needed to create an action plan, visit with local officials and individuals, and submit their findings and recommendations. This initiative is evident and being implemented in all schools that have been visited.
Assessment of School Safety	Identifying and managing safety risks in buildings through structural and non-structural methods is an important part of disaster preparedness in all schools across the country. This step must be prioritized to increase safety and must be implemented and monitored on a regular to annual basis.

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	All schools are implementing this initiative with the help of the school DRR and maintenance team.
Quarterly conduct of the National School-based Earthquake and Fire Drills - Continuing Fire Safety and Awareness Program (FSAP) in Schools	All schools are doing this practice since the Department of Education has mandated this type of culture of safety measure. In the event of a disaster, this approach could have saved a lot of lives and is an effective tool for encouraging others to increase their awareness of disaster preparedness.

C. Environmental Protection and Conservation. By teaching students, the importance of the environment in sustaining life on Earth, environmental education brings everyone closer to the world around them. It also encourages people to think about environmental issues. It teaches students how their choices and actions affect the environment, as well as the knowledge and skills they'll need to face difficult environmental issues and find solutions to keep our ecosystem healthy and sustainable in the future. The behavior of humans that contributes to the destruction of the environment is the result of poor environmental education. That is why it is very important that teachers start teaching young learners about the importance of their living environment. especially on the negative effects of human activities, which greatly affect the present and future generations' resources in order for them to survive. It is the right time to inculcate in the learners' minds how they can act responsibly to protect and conserve the environment with the help of learning materials that focus on concepts and practices about environmental protection and conservation to supplement their learning activities.

Furthermore, the importance of biodiversity and respecting life in an ecosystem can be

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successfully instilled in the learners' minds, resulting in environmental protection and conservation. The school's initiative to promote the protection and conservation of the environment both inside and outside of the campus has been extensively evaluated by the DENR-EMB Regional Office V-Bicol. The twelve schools that were recognized as being eco-friendly and sustainable proudly displayed their unique environmental programs that aid in raising the level of environmental knowledge among their students and community members. Learners must be given a clear understanding of how to safeguard the environment as early as possible. Teachers and other educators have a critical role in influencing students' attitudes regarding the environment.

Therefore, effective learning material can be used to help teachers provide quality instructions that focus on environmental protection. Since environmental protection is one of the most important components of the curriculum for all students, environmental themes must be incorporated as needed at all times in the classroom. This is to ensure that teachers integrate the importance of environmental protection into their daily lessons with the help of learning materials focusing on the best practices that promote environmental protection. Table 3 on the next page discusses some of the top environmental protection and conservation practices used by the schools that have been awarded as sustainable and eco-friendly by the DENR-EMB in Region V-Bicol and have been integrated into the developed learning materials and lessons. A thorough and comprehensive discussion of the identified best practices of sustainable and eco-friendly schools under the environmental protection and conservation category are discussed in this section.

Table 3 Identified best practices in environmental protection and conservation

Best Practice	Description

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Energy Efficiency and Conservation Programs	Energy conservation is the practice of using less energy to save money and lessen the impact on the environment. Best practices that have been implemented by schools are the use of solar panels; replacing traditional light bulbs with LED light bulbs; investing in energy-saving appliances; and ensuring that faculty rooms and classrooms are properly insulated. All twelve of the schools visited are putting his initiative into practice because it is a necessity in every institution to show that they are aware of the call to protect the environment and conserve resources.
Paper Conservation / Paper Recycling	This practice is done effectively by placing trash cans in every classroom and teacher's office. Those trash cans will be used to store the used papers. Before going home every afternoon, students collect or transport those papers to a sorting center where white and colored paper are separated. As a result, the amount of paper garbage on campus will be reduced, and they will gain money by selling the papers gathered. Other papers are for charcoal making by soaking them overnight and placing them into a molder for solar drying. It can now be used for cooking. The schools that are implementing this initiative are the twelve schools that have been visited.

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Water conservation and water management potable water maintenance, including water pollution prevention and/or treatment	Reporting leaks is the most common and effective strategy to conserve water. This type of behaviour is seen in all twelve schools. As soon as they find a leak in a faucet or pipeline, they should contact the school's maintenance personnel for immediate response and repair. Another best practice, known as "Sagip Ilog," in which students, with the assistance of teachers, execute clean and green projects in the community. This was done to save a river and maintain its water level that supplies the agricultural land in the community.
Waste Management Program	As a best practice, all schools have a SWMP committee guided by the mandatory requirements of RA 9003. Providing for an ecological SWMP and creating the necessary institutional mechanisms Separating, reducing, reusing, recycling, composting, having a Material Recovery Facility (MRF), and selling crafts are all viable solutions for managing school waste that have been done by schools visited.
Pollution Prevention Program	These are practices like the no-idling policy, Bantay Tambutso sa Eskwela, and the Linis Hangin Program that contribute to the school's goals of good stewardship and improving environmental practices, as well as lowering greenhouse gas emissions. These initiatives are present in all twelve schools that have been visited.

D. Sustainable Development. Sustainable development is defined as development that meets current needs without affecting future generations' ability to meet their own. On the other hand, Education for Sustainable Development equips students with the knowledge and skills to

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make informed decisions and take responsible actions for environmental integrity, economic viability, and a just society for current and future generations while respecting cultural variety. In this research study, sustainable development is defined as programs and projects that do not harm the environment, promote the common good and cooperation among individuals, teach sustainable livelihoods, and use effective organic farming. These are the best practices that have been implemented by the awarded schools in line with the DENR's search for sustainable and eco-friendly schools.

To achieve collective prosperity, one must understand the concept of education for sustainable development. It is a vital concept to inculcate in the minds of students so that they will grow up to be responsible and understand their role in maintaining the ecological balance that is necessary for life to exist. Learners should also learn how to conserve school resources and make money from the waste they generate. In this section, the best practices under sustainable development have been presented and discussed thoroughly, which can also be done by other schools to foster a culture of sustainability among students.

The suggested initiatives provided by the DENR-EMB under the sustainable development program have been successfully implemented in the schools that the researcher has visited. In programs and initiatives like seedling production, vegetable gardening, and marketing, a spirit of cooperation, not competition, is modeled in the allocation of resources in the school, and students shall learn small business skills through opportunities to organize the school community and projects that became effective; and in fact, they have received an award. Other schools can use these best practices in order to comprehensively instill the values of cooperation and compassion in their students. Best practices from the schools in Region V-Bicol that have received recognition from the DENR-EMB in this category are detailed in Table 4.

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Table 4 Summary of Sustainable Development Best Practices

Best Practice	Description
Seedling Production / Vegetable Gardening and Marketing	In this practice, the school's staff, students, parents, and even community members were involved in a food-producing endeavor as part of the school's expansion strategy. This can be done by hosting a symposium that benefits both learners and community members. With the help of the learners and members of the community, schools have collected seedlings for plantation in both their school yards and in the agricultural space available in their barangay. This allows learners to engage in fundamental business by selling fruits and vegetables to the neighborhood they have harvested in their gardens. This initiative is a common practice that the twelve schools that have been awarded as sustainable and eco-friendly schools are implementing.
A Spirit of cooperation – not competition – is modelled in the allocation of resources in the school	An attitude of cooperation must be inculcated in the learner's mind rather than competition. Cooperative learning helps with student achievement and the development of positive relationships among students, both of which are essential for the development of a learning community that celebrates variety. One of the program's activities is a feeding program, which the Tiwi-Agro Industrial Schools have committed to doing annually as a form of outreach. Other schools demonstrate this initiative in a variety of ways, most frequently through the everyday interactions in the classroom and the students' culminating activities. All twelve of the schools that have been visited had this.

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Student shall learn small business skills through opportunities to organize school community and projects	An example of this effort is an income-generating action, program, or project that is environmentally friendly and has a financial report. Students can learn about sustainability in a fun, engaging, and powerful way. It enables students to take ownership of their actions and offer their vision for a sustainable future. All schools are employing this initiative specifically in the students' entrepreneur day.

Developed Learning Materials in Junior High School Science

In an ideal world, teaching materials would be personalized for the content being taught, the learners in the class being taught, and the teacher. Teaching resources exist in a variety of shapes and sizes, but they all have one thing in common: they can help learners learn. Learning resources in the classroom are critical to students' achieving success. That is, the instructional components of lesson planning in teaching are determined by the resources used in the classroom. In this research study, one of the aims is to develop learning materials based on the identified best practices of sustainable and eco-friendly schools. A learning material that can help both teachers and students to increase their environmental awareness and become effective stewards of nature to promote sustainability, which the department of education is trying to emphasize and thus make a call for all to do the same.

The learning materials developed for teaching junior high school science are based on facts and the identified best practices of sustainable and eco-friendly schools recognized by the Department of Environment and Natural Resources—Education Management Bureau. The identified best practices of environmental initiatives from the twelve schools that have been visited were classified according to climate change adaptation, environmental protection and

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conservation, disaster risk reduction, and sustainable development. There are nine (9) learning materials that have been developed in the form of worksheets in which the identified best practices have been successfully integrated: Earthquakes and Faults; The Impact of Human Activities on an Ecosystem; Learn How to Prevent Pollution; Natural Causes of Species Extinction; Protection and Conservation of Endangered and Economically Important Species; Solar Energy; Typhoon Development; Volcanoes; and Water Conservation Tips.

The researcher has incorporated the environmental best practices that have been identified into the learning materials. Thus, a tool was developed to ensure the integration of best practices from the developed learning materials. This will enable all environmental best practices to be highlighted in the developed learning materials, offering learners an understanding of those practices that can be implemented in their institutions. In addition, the LRMDS validation tool for print resources of the Department of Education has been used to validate the developed learning materials. An expert was tapped to serve as validators, thoroughly examine the materials, and suggest improvements. Said validators are ten experts in the field of science and research in the Schools Division of Albay. They have been carefully chosen to validate the developed learning materials, which makes them exceptionally acceptable.

In the development of learning materials, the DepEd's science curriculum guide has been used as a guide to identify learning competencies that are suited to the identified best practices and to the learning materials and lessons to be developed. Upon examining the curriculum guide, there are learning competencies in other components of science, like earth science and physics, that have been considered in the development of learning materials. This is because the identified best practices were well suited to the competency. For example, the best practices under disaster risk reduction are best integrated into topics in earth science such as earthquake preparedness, typhoon development, and volcanic eruptions. However, there are some practices that have not been included in the development of learning materials due to their inappropriateness and not

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being suited to the specific content of the materials. These practices include the conduct of in-service environmental training for faculty members and the development of students' business skills through opportunities to organize school communities and projects. Instead, these practices were considered in the process of the development of learning materials to make them more effective in promoting environmental literacy among the learners. Moreover, the developed learning materials were based on the learning competencies of the DepEd's curriculum guide, in which the identified best practices are suited for grades 7, 8, 9, and 10.

Furthermore, the developed learning materials followed the 5E model, which includes engagement, exploration, explanation, elaboration, and evaluation. Based on the study conducted by Fazelian et al. (2010), the 5E instructional design model significantly increases the learning of students and their retention in science classes. This means that the environmental concepts being taught to the learners can be effectively transferred to them, helping them become responsible stewards of nature. It is also important to remember that what the student does is more important than what the teacher does. The main task of the teacher is to engage students in learning activities that are likely to result in the desired learning outcomes. As a result, in order to achieve the goal, a teacher must supplement lessons with the use of learning materials. Moreover, the 5E design model is also helpful for educators since it includes steps in which students learn as they move through phases. Such activities are all environmental-related and are based on the identified best practices implemented by the awarded schools.

To delve further, the engagement part of the learning material is presented as "catching up" which includes a short activity that encourages students' interest in a new concept and draws out their past knowledge. This will also help organize students' thinking toward the learning outcomes of the present activities. In the exploration phase, the "let's explore" signals students that they are on to the next phase of the material. Here, the students actively explore the new concept through concrete learning experiences, which gives them the opportunity to learn

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meaningfully. Then, the explanation phase is presented as "concepts at a glance," the focus is on having students integrate new information, ask questions when they need more clarification, and take advantage of opportunities to show off their conceptual understanding, processing abilities, or behaviors. Meanwhile, the elaboration phase or "let's apply" of the material focuses on providing students with room to apply what they have learned. Through new experiences, the students develop a deeper and broader understanding, more information, and adequate skills. Lastly, the evaluation phase or the "check your understanding" gives students the opportunity to assess if they have a complete grasp of the core concepts. This also provides opportunities for teachers to evaluate student progress toward achieving educational objectives.

Aside from the five phases employed in the developed learning materials, there are other features such as images, charts, graphics, and other illustrations that may aid learners in comprehending the environmental concepts being presented. The major purpose of this set of learning resources is to provide meaningful and practical learning with a strong sense of environmental awareness and an environmentally literate learner. Thus, said learning materials have been developed based on the learner's generation to attract them to learn better about environmental awareness. It is colorful, attractive, simple, yet meaningful; the font and size of the letters are appropriate for the intended user and define and supplement the text; it is reasonably light and easy to handle; and it contains adequate illustrations in connection to the text. It also includes a set of guide questions at the end of each activity to purposefully expand the learners' conceptual comprehension.

Moreover, written instructional materials are crucial to teachers' ability to carry out effective teaching techniques. One of the most frequently utilized materials is a worksheet. With a single piece of paper, it is simpler for students to move throughout the classroom or outside of it when doing worksheets and activities. Furthermore, teachers will have a better understanding of their students' skills, preferences, and classroom dynamics by using worksheets. In this study,

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printed learning materials were developed using worksheets in the hopes that students would learn environmental themes efficiently. Worksheets were created using contextualized learning theory to emphasize the importance of finding local solutions to local environmental issues. As a result, learners' environmental literacy will increase, and they will become more responsible in their actions. The table 5 summarizes the learning materials developed based on the identified sustainable and eco-friendly school's best practices.

Table 5 Developed learning materials based on the identified best practices of sustainable and eco-friendly schools

Title of the learning materials developed	**Best Practices of Sustainable & Eco-friendly School** (Basis for the development of LMs)	**Description**
Earthquake and Faults It is a worksheet-type of learning material that includes an infographic about emergency kit lists.	A maintenance culture ensures that all school buildings and their equivalents are kept in good repair and in good condition; Using Multimedia to Raise Awareness and Build Resilience; Assessment of School Safety; and Quarterly conduct of the National School-based Earthquake and Fire Drills - Continuing Fire Safety and Awareness Program (FSAP) in Schools.	This learning material is a worksheet type in which an infomercial has been integrated and the contents of an emergency kit are illustrated in an infographic. This learning material helps to attain learning competency in which the students can differentiate the epicenter of an earthquake from its focus, the intensity of an earthquake from its magnitude, and active and inactive faults. Furthermore, the identified best practices have been integrated into the activities to help

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	Training on providing first aid in the event of disaster or emergency	attain the learning objectives of the lessons.
Impact of Human Activities in an Ecosystem It is a worksheet comprising different activities. In this learning material, an infographic has been used to feature some human activities that negatively affect the ecosystem.	Reforestation and Nursery Establishment, Botanical Garden Establishment, Awareness-Raising Program, Water free Compost Toilet, Palit Ilaw Project, Reporting Water Leaks, Tree Planting activities, Community Outreach Programs, Waste Management Program, and Paper Conservation Program.	It is a worksheet and an infographic that can be used to teach students how to reduce human activities that have a negative impact on the ecosystem. In this learning material, the identified best practices of sustainable and eco-friendly schools have been successfully featured to supplement activities to help teachers attain the targeted learning competency, which may lead the learners to suggest ways to minimize human impacts on the environment.

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Learn How to Prevent Pollution It is a worksheet in which the developed infographic on specific pollution prevention approaches has been integrated.	Presence of environmental clubs and organizations with environmental projects and energy conservation, efficiency programs such as using LED light bulbs, waste management programs, and pollution prevention programs, Tree planting activities, Establishment of botanical gardens, and the use of creating signage to stop pollution.	In a 7th grade topic about atmosphere, one of the learning competencies stipulated in the curriculum guide is explaining how human activities affect the atmosphere. Thus, this learning material mainly focuses on the general techniques for water and air pollution prevention, which is a great step in teaching learners how to properly care for the atmosphere. Furthermore, pollution prevention techniques done by the schools are featured in this worksheet to serve as a source of learning and develop learners who are environmentally conscious.
Natural Causes of Species Extinction It is a worksheet-type of learning material comprising a series of activities that discuss the timeline of species extinction and feature the best practices that can help lessen the rate of species extinction.	Waste management program, pollution prevention program, paper conservation program, establishment of plant nursery and botanical garden, tree planting, and water conservation program.	Natural causes of species extinction are highlighted in this learning resource. The activities that have been featured in this material encourage students to provide suggestions to slow or stop the rate of extinction. Extinction causes were discussed and provided in the worksheet, which is why some animals no longer exist today. Then, a series of activities related to the presentation were also provided on a worksheet.

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Protection and Conservation of Endangered and Economically Important Species It is a worksheet with an infographic about the different best practices of sustainable and eco-friendly schools.	Paper and water conservation program, waste management program, pollution prevention program, and energy efficiency program.	This learning material comes in the form of worksheets and infographics. The infographic type has been injected into a worksheet as a separate activity in which the identified best practices have been featured. Through this, the learning objectives will be attained successfully and effectively by the learners. Moreover, both resources will elicit suggestions from learners about how to help protect and conserve economically important species, which is why the infographic and worksheet were made as one.
Solar Power: The Unlimited Source of Energy It is a worksheet with different student activities related to solar energy as a source of clean energy and electricity.	This learning material was inspired from the best practice of the school that is using solar panels to generate electricity. Energy Efficiency and Conservation Program	This learning material aims to enlighten students about the sun's limitless energy supply. It focuses mainly on how solar panels capture the sun's energy and convert it into electrical energy. The pros and cons of using solar panels are presented in the worksheet. This material can be used to understand the learning competency of explaining how energy is generated, transmitted, and distributed using solar panels. Furthermore, this will provide learners with more interactive activities to promote the effective transfer of concepts and environmental skills.

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Typhoon Development It is a worksheet with an infomercial and an infographic about typhoon development and typhoon preparedness.	Awareness Raising Program: Informing people about their risk; Using Multimedia to Raise Awareness and Build Resilience; Youth Participation in Disaster Risk Reduction	It is a worksheet that focuses mainly on a learning competency: the students should be able to explain how typhoons develop. In this material, conditions of a typhoon's formation, as well as public storm warning signals, were depicted in an infographic to visually teach students about how typhoons develop and how strong a typhoon is using guide questions. Disaster preparedness has also been highlighted in this material, such as the things to do before, during, and after a typhoon.
Volcanoes It is a worksheet that focuses on the effects of volcanic eruptions	Awareness Raising Program: Informing people about their risk; Using Multimedia to Raise Awareness and Build Resilience; Youth Participation in Disaster Risk Reduction	It is a worksheet in which the major types and parts of a volcano, types of eruptions, and dangers posed by a volcano are featured in the activities. Using the activities in this material, such as volcanic hazards, will help learners understand disaster preparedness. Through this, it may encourage learners to understand safety precautions. The identified best practices on disaster risk reduction have been integrated into the "let's apply" part of the material, in which they have to list down the things to do before, during, and after a volcanic eruption.

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Water Conservation Tips A worksheet about conserving water resources.	Water conservation and water management potable water maintenance, including water pollution prevention and/or treatment, reporting leaks, sagip ilog, and a water free compost toilet.	This learning material focuses mainly on how to use Earth's resources sustainably. Here, water resources were used as an example of Earth's resources, as they are one of the most important resources for every human being. This material started with a simple activity in which the students will be conducting a school water audit, which will assist learners in understanding how the school community uses water. Then, the identified best practices have been featured as an example of what a student can do to conserve water resources in school and at home.

Lessons using the developed learning materials

Students of today's generation are regarded as visual learners, as the world today is focused on the rapidly changing world of technology, brought about by what has been dubbed "education in the new normal." Teachers must work on the development of new learning materials that focus on their individual learning styles as another approach to joining the trend among the new generation of learners. Integration of developed learning materials regarding sustainability and environmental awareness is one way to capture learners' attention and then find a way to immerse them in the principles of being environmentally literate.

The lessons that have been developed are intended to help learners and teachers promote an effective and fun learning experience on environmental awareness, particularly in their

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teaching and class discussions, by involving students in a variety of activities to develop high-sense environmental stewardship. Making successful lesson plans takes time, diligence, and understanding the learners' goals and abilities, which is why teachers are referred to as lesson planners. In this research study, the lessons developed are based on the 5-E inquiry model, which includes engage, explore, explain, elaborate, and evaluate. Then, content standards, lesson learning competencies, performance standards, objectives, subject matter, lesson activities, evaluation, and homework are all included in each lesson. Furthermore, each lesson incorporates the developed learning resources, which are based on the identified best practices of sustainable and eco-friendly schools.

There are nine (9) lessons developed using the developed learning materials. These lessons are inquiry-based and focused on how the students would learn the content and at the same time develop process skills by using the worksheets that have been developed that are based on the identified best practices of sustainable and eco-friendly schools. Each lesson developed was incorporated with the best practices on environmental protection and conservation as featured content so that the learners would successfully become environmentally literate with a high sense of awareness. All the lessons were developed to provide the students with an opportunity to learn what they can do as students to help protect and conserve the environment for future use. Furthermore, the developed lessons do not just focus on biology; other components of science were also considered in the development of the materials. It was done to successfully present the identified best practices that are suited to a specific learning competency. Thus, the developed learning materials focused mainly on junior high school science.

The identified best practices were integrated into the developed lessons as a featured learning activity. Said activity focused mainly on the environmental concepts into which the best practices were integrated to support the attainment of the learning objectives. Through this, environmental concepts and other scientific literacy skills can be taught to the learners by

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immersing them in real-world examples and activities. Thus, the appropriateness of the topic of the said best practices was also considered to ensure that this is realistic and time-bound. An example of how the identified best practices were used and integrated into the lessons is through the provided learning activity in which the learners are encouraged to suggest ways on how to properly care for the environment, making a call to protect the environment, planning on how to make human actions advantageous to the environment, making plans in case of emergency, and other ways of promoting the use of sustainable and eco-friendly locally made products. By employing this kind of method in lessons, teachers can successfully develop learners with a desirable attitude towards the environment.

In this study, the lessons that have been developed are based on the developed learning materials, in which the identified best practices of sustainable and eco-friendly schools were used as a foundation. The developed lessons, learning competencies used, developed learning materials, and parts of the lesson where the learning materials were used are shown in Table 6 below. After the table, a thorough discussion of each developed lesson was provided, in which the learning materials as well as the identified best practices were used and integrated.

Table 6: Developed Lessons

Lesson Developed	Learning Competency	Developed Learning Materials	Part of the lesson it is present and used
Earthquakes and Faults	The learners should be able to differentiate the epicenter of an earthquake from its focus, intensity of an earthquake from its magnitude, and active and inactive faults (S8ES-IIa-15).	Worksheet on earthquakes and faults with infographics on earthquake emergency kit list	The parts of the developed worksheet will be used in the entire lesson, starting from the engagement part until the evaluation part.

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			The activities in the "let's explore" part of the learning material will help to attain the learning objective in which the students should differentiate the epicenter of an earthquake from its focus, the intensity of an earthquake from its magnitude, and the active and inactive faults. In the "concepts at a glance" phase of the material, the second objective of the lesson will be attained, in which the students will list the things to do before, during, and after an earthquake. In the "let's apply" phase of the material, it helps to attain the objective in which the students will prepare an emergency kit or on-the-go bag that can be used in case of an emergency.

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Impact of Human Activities in an Ecosystem	The learners should be able suggest ways to minimize human impact on the environment. (S8LT-IV-j-25)	Worksheet and an infographic on Impact of Human Activities in an Ecosystem	The worksheet will be used in all parts of the discussion to perform some activities that supplement the lessons and help to attain specific learning objectives, to be specific: The "catching up" phase of the material will help learners analyze the changes caused by humans in their environment to ensure their survival. The activity in the "let's explore" part of the material focused on encouraging the students to make suggestions on how to reduce human impact on the environment. In the "let's apply" phase of the material, the student's task is to create an infographic on how human activities disrupt and alter the environment to meet their needs.

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Learn How to prevent Pollution	The learners should be able to explain how some human activities affect the atmosphere. (S7ES-IVe-6)	Worksheet on learn how to prevent pollution and an infographic about specific pollution prevention approaches	All activities provided on the worksheet on learning how to prevent pollution will be used in every part of the lesson to make the discussion interactive and help learners work independently. Below are the activities on the learning material that were used to attain the learning objectives of the lesson: The activity in the "catching up" phase helps students identify human activities that affect the atmosphere. The "let's explore" part of the material focused on the activity that enables learners to describe various pollution prevention approaches. The activity on the "let's apply" part of the material encourages the students to suggest activities that reduce

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			pollution to help protect the atmosphere.
Natural Causes of Species Extinction	The learners should be able to relate species extinction to the failure of populations of organisms to adapt to abrupt changes in the environment. (S9LT-Ie-f-30)	Worksheet on Natural Causes of Species Extinction	As with the other worksheets, the activities provided in the learning material will be used throughout the lessons. These activities will also help with the attainment of the learning objectives. The "catching up" phase focused on the activity that allowed the students to explain how natural factors can contribute to the diversity crisis and species extinction. On the "let's explore" part of the material, the students will make a timeline of five mass extinctions in biological history using the graphic organizer provided, and their outputs will serve as their basis for developing a multimedia presentation. The conservation programs

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			are examples of the identified best practices provided in the "let's apply" phase of the material. In this activity, the students will explain how these activities will help preserve the environment and slow the rate of species extinction.
Protection and Conservation of Endangered and Economically Important Species	The learners should be able to explain the advantage of high biodiversity in maintaining the stability of an ecosystem. (S8LT-IVh-21)	Worksheet on HIPPCO and an Environmenta-List: An Infographic depicting Community's Environmental Protection and Conservation Efforts	As the lesson goes on, the learners should explain how important the diversity of species is to human lives using their worksheet. Thus, all activities provided in the worksheet will also be used in the entire lesson. Activity 1 on the "catching up" phase of the material tasked the students with explaining the advantage of high biodiversity in maintaining the stability of an ecosystem. The "let's explore" part of the material helps attain the lesson objective that

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			determines which human activities impact negatively on the ecosystem by performing the activity about HIPPCO. In the concepts at a glance phase of the material, the students are tasked with proposing methods or actions that improve environmental stability by promoting preservation and conservation. The "let's apply" phase of the material focused on the task in which the students will create an infographic to feature their community's efforts in protecting and conserving the ecology.
The Solar Power: The Unlimited Source of Energy	The learners should be able to explain how electrical energy is generated, transmitted, and distributed. (S9FE-IVh-j-46)	Worksheet on The Solar Power: The Unlimited Source of Energy	All activities provided in the worksheet are essential to successfully capturing the learning objectives. Thus, all learning activities in the worksheet will be used

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			in all parts of the lesson, specifically on: The process of generation, transmission, and distribution of electrical energy using the solar panels, as well as the advantages and disadvantages of using solar panels, were provided in the "concepts at a glance" phase of the material. In the "let's apply" phase of the material, the activity is to create a multimedia presentation regarding what they have learned about the use of solar energy to produce electrical energy.
Typhoon Development	The learners should be able to explain how typhoons develop. (S8ES-IId-18)	Worksheet on typhoon development and an infographic on preparing for a typhoon	To help the learners successfully comprehend how typhoons develop, describe typhoon anatomy, and interpret PSWS, all learning activities to be used in the lesson are present in the worksheet about typhoon development.

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			The typhoon development and the anatomy of a storm were presented in the "concepts at a glance" phase of the material, while the activities on describing the public storm warning signals and things to do before, during, and after a typhoon were given in the "let's apply" phase of the material.
Volcanoes	The learners should be able to explain what happens when volcanoes erupt. (S9ES-IIIb-28)	Worksheet on volcanoes	Here, the learners will identify the types of volcanic hazards and explain the danger they pose to both agriculture and the community. These can be done by employing the activities on the worksheet. Thus, all activities in the worksheet are essential to attaining the lesson objectives. The different types of volcanoes were presented in the "catching up" and "concepts at a glance" phases of the material.

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			On the "let's explore" part of the material, the activity on the different types of volcanic hazards and their damaging effects on people and the economy has been provided. The "let's apply" phase of the material helps students suggest ways to do things before, during, and after volcanic eruptions.
Water Conservation Tips	The learners should be able to describe ways of using Earth's resources sustainably. (S7ES-IVc-4)	Worksheet on Water Conservation Tips	Activities in the engagement, exploration, explanation, elaboration, and evaluation parts of the lesson are all present in the developed worksheet on water conservation tips. Specifically, these activities help to attain the learning goals provided in the lesson. On the "catching up" part of the material, the learners are tasked with

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			conducting a school water audit to have a better understanding of how and where water is used in school. The importance of practical water-saving tips was given in the "let's explore" and "concepts at a glance" phases of the material. The "let's apply" phase of the material focused on the local conservation efforts in conserving water.

Teacher's Level of Acceptability of the Developed Learning Materials

In a classroom setting, instructional materials are a critical component of the teaching-learning process. The utilization of developed learning materials has a number of advantages for both teachers and students. A teacher who uses the developed learning materials in the classroom can quickly pique students' interests, motivate them to participate, and increase classroom interactions during the teaching and learning process. As a result, students' environmental awareness and level of environmental literacy can be increased as these developed learning materials mainly focus on how to properly care for and conserve the environment, in which the identified best practices of sustainable and eco-friendly schools have been successfully integrated. Furthermore, it will acquire a mindset that encourages good environmental stewardship, as many

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experts believe that using learning materials may help students understand concepts better and apply them in real-life settings.

The process of conducting a critical investigation or making a judgment with the goal of improving the effectiveness of an activity or program is known as evaluation. The evaluation data can be used to show whether the developed learning materials are successful and worthy of continued use. The teacher's level of acceptability of the developed learning materials was determined by the science teachers using the acceptability tool that has been adapted and modified from previous research. These experts were tapped to take the test on the acceptability tool and successfully solicit comments and suggestions for improvements. The tool that has been used to measure the teacher's level of acceptability of the developed learning materials was the tool that was developed by Guemo (2019), which she used in her study to measure the teacher's level of acceptability of her developed learning materials. Content, usefulness, and design are the three criteria used to validate the acceptability of developed learning materials. The jurors used the following scale: 5 is highly acceptable, 4 is moderately acceptable, 3 is acceptable, 2 is fairly acceptable, and 1 is poorly acceptable. In addition to numerical ratings, jurors were requested to provide comments, suggestions, and recommendations in order for the learning materials to be more effective, easy to use, and successful in imparting instructions.

The results of the jurors' evaluation on determining the level of acceptability of the developed learning materials were used to present the findings. On the Likert scale, with five (5) being the highest and one (1) being the lowest, the jurors' responses in every learning material were totaled and have successfully computed their mean. Then, the results of the evaluation of the ten teachers were presented in tabular form with their corresponding adjectival ratings. The percentage of teachers who stated that the materials were highly acceptable was then calculated using ratio and proportion in the form of a percentage. Using this kind of method, the teachers' level of acceptance of the developed learning materials and lessons can be presented in a simple

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yet clear and easy-to-understand manner. Furthermore, following the presentation of the data gathered, a thorough discussion of the results of the level of acceptability has been presented. The implications of the teachers' assessment of the learning materials as well as the use of identified best practices were included in the said discussion.

From the science teachers' thorough evaluation of the developed learning materials and with the use of the tools, the development of learning materials became successful and has ensured that it is consistent with the standards. Furthermore, the integration of the identified environmental best practices into the materials was also successful, allowing the materials, when used, to promote a positive environmental attitude and critical thinking skills. Thus, the teachers' assessments of developed learning materials are given on numerical rating scales with mean scores and descriptions. The scores given by the teachers were collected and analyzed for their means to successfully present relevant data in the context of acceptability as well as their adjectival ratings. Table 7 summarizes the results of the teachers' level of acceptability of the developed learning materials.

Table 7 Summary of teacher's level of acceptability of the developed learning materials

Juror	Developed Learning Materials									Mean	ADI
	1	2	3	4	5	6	7	8	9		
1	5.00	4.73	4.40	5.00	4.67	4.67	4.73	4.13	4.80	**4.68**	Highly Acceptable
2	4.80	4.67	4.53	4.80	4.53	4.73	4.53	4.47	4.60	**4.63**	Highly Acceptable

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3	4.47	4.33	4.47	4.53	4.53	4.60	4.33	4.40	4.53	**4.47**	Moderately Acceptable
4	4.60	4.73	4.67	4.80	4.67	4.67	4.67	4.67	4.73	**4.69**	Highly Acceptable
5	4.40	4.47	4.53	4.67	4.53	4.67	4.60	4.67	4.73	**4.59**	Highly Acceptable
6	4.33	4.53	4.60	4.67	4.80	4.60	4.67	4.60	4.67	**4.61**	Highly Acceptable
7	4.67	4.67	4.73	4.80	4.73	4.67	4.67	4.73	4.67	**4.70**	Highly Acceptable
8	4.53	4.27	4.33	4.33	4.60	4.60	4.53	4.60	4.53	**4.48**	Moderately Acceptable
9	4.73	4.67	4.60	4.67	4.67	4.53	4.53	4.60	4.53	**4.61**	Highly Acceptable
10	4.53	4.73	4.53	4.60	4.67	4.53	4.60	4.60	4.60	**4.60**	Highly Acceptable
Overall Mean	**4.61**	**4.58**	**4.54**	**4.69**	**4.64**	**4.63**	**4.59**	**4.55**	**4.64**	**4.61**	**Highly Acceptable**

According to the findings, it is revealed in Table 10 above that the teacher's level of acceptability of the developed learning materials, as evaluated by the experts, garnered an overall mean score of 4.61, interpreted as "highly acceptable." Furthermore, based on the results on the

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teachers' level of acceptability of the developed learning materials, it is also revealed that 80% or 8 out of 10 teachers said that the developed learning materials are "highly acceptable," and thus, 20% or 2 out of 10 teachers said that the developed learning materials are "moderately acceptable." This means that based on the level of acceptability assessed by the teachers, all the developed learning materials are suitable and can be used as instructional materials. It is indeed true that teachers' roles in identifying appropriate materials for their students' learning are vital. Teachers must be one step ahead and dynamic in attending to their students' learning (Hammond, 1998). Moreover, suggestions and comments from the teachers had a significant impact on the study, particularly on the quality of the developed learning materials based on their distinct features.

Noticeably, based on the results presented above on the teachers' level of acceptability of the developed learning materials, learning material number 4 (Natural Causes of Species Extinction) got the highest mean of 4.69 and was regarded as "highly acceptable," while learning material number 3 (Learn How to Prevent Pollution) got the lowest mean of only 4.54 and was also regarded as "highly acceptable." As learning material number 4 got the highest mean score among the nine developed learning materials, this implies that the teachers find the above mentioned learning material to exhibit clear instructions, ease of use, intuitive features, interesting and appealing exercises, and an appropriate response. However, as the learning material number 3 got the lowest mean score, this implies that the teachers find this specific learning material to have a lower attainment level of the criteria compared to the other eight learning materials, but this material still got "highly acceptable" remarks from the teachers.

To delve further, in terms of content arrangement, the nine developed learning materials got an overall mean score from the jurors of 4.59, or highly acceptable (see Appendix M, Evaluation Summary of the Results of the Juror's Level of Acceptability of Each Developed Learning Material on Content, Usefulness, and Design Criteria). This implies that the contents of

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the materials were aligned to the DepEd's learning competencies, which can be used as a supplemental tool in teaching, and that the sequence created for all of the developed learning materials was simple and easy to follow. Furthermore, critical thinking can be encouraged by the content of the developed learning materials, and when used, said materials can adequately convey the message of the subject or topic. Learning can be reinforced through the employment of a range of learning resources that engage, motivate, and hold students' attention.

Then, the other criteria that have been looked for by the teachers in assessing the learning material's level of acceptability are the usefulness of the materials developed. It got an average score of 4.60, interpreted as "highly acceptable" (see Appendix M, Evaluation Summary of the Results of the Juror's Level of Acceptability of Each Developed Learning Material on Content, Usefulness, and Design Criteria). This implies that the learning materials developed are user-friendly since the learning activities provided are engaging, challenging, and exciting, and the material's level of difficulty is appropriate for the learners for whom the materials were intended. Said materials also provide adequate acquisition of knowledge, skills, and attitudes, which helps them attain a learning competency standard. These attributes are present in the developed learning materials under the criteria of usefulness. Moreover, the developed learning material can be used as an innovative ICT teaching tool, according to the experts who assessed the said materials.

Furthermore, based on the specific criteria for the level of acceptability of the developed learning materials under the design criteria, teachers believed that these developed learning materials could enhance the understanding of concepts and improve the visual learning of the learners through their content and visual design, which included clear use of illustrations and readable text. As a result, the learning materials received a mean score of 4.61 under design criteria, which is considered "highly acceptable" (see Appendix M, Evaluation Summary of the Results of the Juror's Level of Acceptability of Each Developed Learning Material on Content,

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Usefulness, and Design Criteria). The features under the design criteria are all present and were observed by the jurors, resulting in a very good rating and impression from the experts.

Notably, the nine developed learning materials got an overall positive impression and good remarks from the teachers who evaluated the materials using the acceptability tools. This suggests that the learning materials have met the criteria and standards for making effective materials. It is also noted that the identified best practices of sustainable and eco-friendly schools have been successfully integrated into the learning materials, which promote and encourage critical thinking among the learners. The integration of environmental best practices into the learning materials is one of the most effective ways to inculcate in the learner's minds and hearts the importance of learning environmental solutions to address the environmental issues they have identified. Furthermore, this will help learners increase their level of environmental awareness and develop an attitude towards being responsible stewards of nature. In the same way, teachers can also get ideas on how to successfully integrate these best practices into their daily instruction. Through the use of learning materials as a supplemental tool in teaching, lessons can become fun, exciting, and meaningful at the same time.

As mentioned before, the researcher also solicited feedback and suggestions from experts, who assessed the acceptability of the developed learning materials and suggested ways to improve them. Overall, all the learning materials received an outstanding rating, as they received "highly acceptable" remarks from the teachers. This only means that the developed learning materials could be a great help for both teachers and students to learn better and effectively develop students who have a high sense of environmental awareness and are good stewards of nature.

Teacher's Level of Acceptability of the Developed Lessons

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There were nine (9) lessons that were developed using the learning materials in which the identified best practices were integrated. These lessons are as follows: earthquakes and faults; the impact of human activities in an ecosystem; how to prevent pollution; natural causes of species extinction; protection and conservation of endangered and economically important species; solar energy; typhoon development; volcanoes; and water conservation tips. Such lessons followed the 5E instructional model, which has five phases: engage, explore, explain, elaborate, and evaluate. This model has been used because the researcher strongly believes that using an inquiry-based approach can help students build a strong foundation of knowledge through active participation. As a result, the environmental best practices that have been identified and incorporated into the lesson can effectively engage the students and motivate them to learn by putting such initiatives into practice in their local communities.

Then, the developed lessons have been evaluated by the science teachers using the level of acceptability tool, which was adapted and modified from the tool developed by Orolfo (2020). Some of the indicators of the said tool were revised to fit in the current study. Then, it has also been validated by the experts to ensure that the modified tool will become effective in determining the teachers' level of acceptability of the lessons. This procedure is necessary to make sure that the lessons developed meet the quality and standards required by the education department. The same set of teachers who determined the level of acceptability of the developed learning materials have also determined the level of acceptability of the developed lessons. As experts in the field, the jurors carefully evaluated the applicability of the indicators in each component of the lesson on the said tool. They have provided their honest assessment of each lesson after thoroughly evaluating the developed lessons and rating them based on their perception and keen observation. The jurors use the following scale: 5 is highly acceptable, 4 is moderately acceptable, 3 is acceptable, 2 is fairly acceptable, and 1 is poorly acceptable. Aside from numerical evaluation, the jurors were also asked for their comments, suggestions, and recommendations in order for

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the lessons to be effective in delivering instructions. The summary of the teacher's level of acceptability of the developed lessons is given in table 8 below.

Table 8 Summary of the teacher's level of acceptability of the developed lessons

Juror	Developed Lessons									Mean	ADI
	1	2	3	4	5	6	7	8	9		
1	4.67	4.60	4.60	4.53	4.47	4.33	4.60	4.47	4.40	4.52	Highly Acceptable
2	4.67	4.67	4.47	4.40	4.40	4.53	4.67	4.53	4.47	4.53	Highly Acceptable
3	4.73	4.67	4.60	4.40	4.47	4.27	4.47	4.47	4.27	4.48	Moderately Acceptable
4	4.67	4.67	4.53	4.53	4.40	4.33	4.60	4.53	4.47	4.53	Highly Acceptable
5	4.53	4.73	4.67	4.47	4.53	4.33	4.60	4.60	4.47	4.55	Highly Acceptable
6	4.73	4.53	4.60	4.60	4.53	4.33	4.60	4.47	4.40	4.53	Highly Acceptable
7	4.80	4.47	4.80	4.67	4.73	4.40	4.80	4.80	4.73	4.69	Highly Acceptable

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8	4.60	4.60	4.53	4.53	4.47	4.27	4.67	4.47	4.53	4.52	Highly Acceptable
9	4.67	4.60	4.67	4.60	4.53	4.33	4.60	4.60	4.53	4.57	Highly Acceptable
10	4.53	4.67	4.53	4.60	4.53	4.47	4.60	4.53	4.60	4.56	Highly Acceptable
Overall Mean	4.66	4.62	4.60	4.53	4.51	4.36	4.62	4.55	4.49	**4.55**	**Highly Acceptable**

Based on the table above, it is revealed that the acceptability of the developed lessons received exceptional feedback from the teachers who took the acceptability test. To be exact, 90% of teachers, or 9 out of 10, said that the developed lessons are "highly acceptable," while 10% of teachers, or 1 out of 10, said that the developed lessons are "moderately acceptable." In fact, all nine developed lessons got a mean score of 4.55, which is interpreted as "highly acceptable." This only implies that the developed lessons, as evaluated by the science teachers, have successfully integrated the identified best practices of sustainable and eco-friendly schools, aligning them to the learning competencies and learning objectives. Then, when it comes to the learning activities provided, it has been ensured that best practices are featured in the activities that help to attain the lesson objectives. Likewise, on the learning assessment, it has also been determined that the given evaluation promotes an opportunity to demonstrate mastery of the environmental concepts learned in the lessons. Furthermore, this also suggests that the lessons are compliant with the DepEd's standard for developing lessons, and as a result, the lessons can be used by the teachers in delivering quality instruction.

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Remarkably, lesson number 1 (Earthquakes and Faults) got the highest mean score of 4.66, interpreted as "highly acceptable," and lesson number 6 (Solar Power: The Unlimited Source of Energy) got the lowest mean score of 4.36, regarded as "moderately acceptable." As lesson number 1 received the highest mean score from the teachers, this implies that this lesson has outstandingly met all the criteria provided in the tool, which was also used as a guide during the lesson's development. Moreover, this also suggests that the identified best practices are well suited and well incorporated into the lesson activities that help learners promote environmental awareness and become responsible individuals. On the other hand, lesson number 6, which got the lowest mean score among the developed lessons from the teachers, implies that it has moderately achieved the criteria provided in the tool but is still considered acceptable and can be an effective material in providing opportunities for the learners to learn more about environmental best practices and concepts. Based on the tool that the experts used to determine the level of acceptability of the developed lessons, the teachers carefully checked the congruency of the instructional objectives to ensure that they were correctly aligned with the learning activities and evaluation. Thus, the evaluation of the experts shows that the congruence of instructional objectives with learning activities and assessments was properly aligned, which is why the lessons got exceptionally high ratings and good feedback from the teachers who assessed and evaluated them.

To delve further, when it comes to the learning objectives component, the experts ensured that the developed lessons adhered to DepEd's Learning Competencies. Under this criterion, all lessons developed got a mean score of 4.53, interpreted as "highly acceptable." This implies that the learning objectives are clearly stated and align with the Department of Education's learning competencies. Then, it is also revealed that the learning objectives are realistic, which provides the learners with an opportunity to demonstrate their learning about environmental best practices. Through this, the students could be creative thinkers who effectively carry out the best

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practices of sustainability and eco-friendliness in their everyday lives. It was also highlighted by the teachers that the developed learning materials are successfully integrated into the lesson to encourage the advancement of the scientific process and skills among the students.

On the learning activities component, the prepared activities in the developed lessons have been evaluated to ensure the integration of the identified best practices as well as their relevance to the topic and their ability to support the achievement of the learning objectives. In this specific criterion, all lessons developed got a mean score of 4.55, interpreted as "highly acceptable" by the teachers. This implies that the prepared activities in the lessons exhibit clear instruction, which makes the activities easy to understand and easy to perform, relevant to the real-life situations in which the environmental initiatives and best practices were featured, and can develop learners with a strong sense of responsibility and a high level of environmental literacy. Furthermore, it was also revealed that the learning activities, when used, can facilitate a clear understanding of environmental and other science concepts that help students accomplish activities correctly and successfully.

Lastly, on the learning assessment component, the teachers have also assessed the congruency of the predetermined learning goals with the learning assessment and learning activities. In fact, all lessons developed got a mean score of 4.80, interpreted as "highly acceptable" as assessed by the teachers using the acceptability tool for developed lessons. This implies that the learning assessments in the lessons adhered to the standards in creating assessments for students to measure their learning on the environmental best practices that have been featured. All learning assessments were anchored to the learning objectives and learning activities, focusing on the environmental-based activities that make the lesson effective and acceptable based on the results given by the experts. Most importantly, the learning assessment in the developed lessons provides an opportunity for students to demonstrate mastery of the important and relevant environmental concepts they have learned.

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Based on the findings from the experts' evaluation, it is shown that the developed lessons are well crafted, in which the identified best practices of sustainable and eco-friendly schools have been integrated, adhering to the standards for preparing lessons for an effective and successful transfer of knowledge to the learners. As a result, the developed lessons received positive feedback from the teachers, who assessed and determined the level of acceptability using the acceptability tool for the developed lessons. Furthermore, using the experts' solicited suggestions for improvements, the developed lessons can now be considered an effective tool to improve learners' environmental literacy, raise their environmental awareness, and be used in a classroom setting to deliver quality instructions to the students.

Conclusion

Based on the analysis of the findings, the following conclusions are formed:

1. Programs that help safeguard the environment are among the identified best practices of sustainable and eco-friendly schools. As the school implements these practices, they serve as a model for what is appropriate and what learners should do in order to contribute to environmental stewardship and become responsible stewards. The researcher strongly believes that sharing the findings of this study will aid in improving environmental literacy among learners. Environmental education provides learners with a valuable opportunity to engage with real-world concerns outside of the classroom. They can apply what they learn in the classroom to the complex environmental issues that threaten our planet, and they can gain the skills they'll need to be creative problem solvers and effective advocates.

2. The identified best practices of sustainable and eco-friendly schools were successfully used as a foundation for the development of learning materials that can be used by teachers in

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teaching junior high school science. The jurors gave all nine (9) developed learning materials passing marks in terms of content, format, presentation, organization, accuracy, and up-to-dateness of information, recommending approval for public school use.

3. The developed lessons using the developed learning materials were assessed by the experts and deemed very good. The alignment of the learning objectives, learning activities, and learning assessment were evaluated and assessed by the experts and garnered passing marks, recommending their approval to be used in teaching science lessons. The prepared lessons for teaching junior high school biology based on the developed learning materials are now considered an aid for teachers in order for learners to improve their grasp of concepts and skills by engaging in various activities linked to environmental awareness.

4. The teachers who assessed the level of acceptability of the developed learning materials and lessons gave exceptionally positive feedback. The learning materials were highly acceptable based on their content, usefulness, and design, while the developed lessons were also highly acceptable based on their learning objectives, learning activities, and learning assessment.

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