Uses of mirrors and lenses: An evaluation of grade 10 DepEd learning module

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Abstract

Researches and studies suggest that there are issues and room for improvements spotted in the DepEd-issued Learning Materials. This study aimed to evaluate the Grade 10 DepEd Science Learning based on the quality of its content and its potential effectiveness as a teaching tool and to identify its weaknesses and strengths. The study used a descriptive evaluative research design. The participants for this study were Grade 11 students of Calbiga National High School, Calbiga, Samar, and were selected via purposive sampling. Out of 129 target population, 97 participants were chosen using criteria. The researchers used a modified module evaluation criteria checklist from a dissertation to collect quantitative data. Ethical procedures were followed in the entire conduct of the study. Quantitative data were analyzed through descriptive statistics. The recommendations from respondents were collated and summarized to formulate a complete thought for further improvements of the evaluated module. The results and findings of this study yielded a conclusion indicating that the module material is good but still needs revisions and modifications. Research findings recommend further interventions and studies to minimize errors in the learning module and its effects on students' quality of learning.

Keywords: evaluation; learning materials; module; teaching tool; quality content

1. Introduction

COVID-19 has dramatically impacted the lives of many people around the globe. At the beginning of 2020, when COVID-19 hit the city of Wuhan in China, people within the remainder of the world could not suspect that the virus would travel everywhere globally and alter how people live, interact, work, teach, and learn. The Department of Health (DOH) confirmed the presence of local transmission within the Philippines.

It instantly raised the Health Alert Level to Code Red Sub-Level 1 on March 7, 2020, all covered and publicized by local media and official government press association (Santos, 2020; Parracho, 2020). Institutions, national down to the local level government in the Philippines, were mandated to act per the Proclamation No. 922, s. 2020, declaring a state of public health emergency throughout the Philippines (Malacañang Records Office, 2020). This proclamation is established to curb, if not manage, the spread of the said respiratory virus, which according to Phelan, Katz, & Gostin (2020), started in Wuhan, China. Both national and local governments in the whole world have strictly followed and employed quarantine protocols and temporarily shut down their educational institutions. As a result, more than a billion learners have been affected worldwide (UNESCO, 2020a). Among this number are over 28 million Filipino learners across academic levels who have to stay at home and comply with the Philippine government's quarantine measures (UNESCO, 2020b).

Educational institutions are one of the most affected social institutions brought about by this pandemic. With the current situation here in the Philippines, the safety of students, teachers, and administrators was prioritized. Hence, the entire educational system in the country is forced into the challenge of continuing the teaching-learning process without compromising the health and safety of everyone involved in the process. With this, the Department of Education (DepEd) decided to shift from the usual set-up of face-to-face classes to distance learning until any prohibition by the DOH, the IATF, or the President for face-to-face learning in schools is lifted or relaxed. Moreover, DepEd adopts the Basic Education - Learning Continuity Plan (BE-LCP), considering the COVID-19 pandemic (Llego, 2020). BE-LCP is a package of education interventions that will respond to fundamental education challenges brought about by COVID-19. Secretary Briones said that the BE-LCP is the best option that the Department of Education can have to protect the health and well-being of the students, teachers, and personnel (Magsambol, 2020a). Due to students' accessibility issues with technology, modular learning serves as the backbone of DepEd in this distance learning. In this learning mode, teachers are making self-learning modules distributed and used by the students. As stated in the DepEd Order No. 018, s. 2020, Self-Learning Modules (SLMs) are self-contained, self-instructional, self-paced, and interactive learning resources for public schools intended for learning a specific topic or lesson where the learner interacts actively with the instructional material rather than reading the material passively.

DepEd issued guidelines in making SLMs to produce the best modules for modular learning. However, teachers cannot avoid errors when making these materials. There have been numerous reports (Hernando-Malipot, 2020c; Magsambol, 2020b) regarding the mistakes committed in the DepEd learning materials, including the use of vulgar words. Even some celebrities addressed these issues, and one of them is Lea Salonga, a famous Broadway singer. On one of her social media accounts, she posted one of the items in the module wherein tattoos symbolize someone being a "criminal" (Hernando-Malipot, 2020c). Moreover, several images of inaccurate modules have circulated online since the start of classes on October 5, 2020 (Hernando-Malipot, 2020c). DepEd revealed that most of the errors discovered in the first quarter Self-Learning Modules for distance learning this school year, 2020-2021, were factual and numerical or math equation-related errors (Magsambol, 2020b). Furthermore, Nicholls (2021) emphasized that it ranges from factual to typographical, spelling, and grammatical errors. Due to time constraints, the errors were caused, as DepEd admitted that not all SLMs pass through quality assurance at the DepEd central office. Diosdado San Antonio, the DepEd Undersecretary for Curriculum and Instruction, mentioned that teachers need to exert more effort to clarify such errors in succeeding lesson materials or while communicating with the learners and parents (Hernando-Malipot, 2020c).

With multiple errors reported, critical review of the modules before dissemination must be given ample time to ensure the modules' quality. The aforementioned reports or issues about the modules can help the teachers and personnel to evaluate or improve the quality of the SLMs. To further enhance the quality of

the modules, evaluation can be of immense help. Module evaluation is fundamental to improving teaching and considering how learning opportunities for students may be enhanced. In this study, Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses (see Appendix A) is evaluated by the selected Grade 11 students. The module was chosen by the researchers to be evaluated because among the self-learning modules produced by the Department of Education for Grade 10 Science, Module 4 entitled, Uses of Mirrors and Lenses is the only module for Quarter 2 that consists of two or more lessons. Hence, providing the researchers a wider scope for the module evaluation. Furthermore, module evaluation alerts teachers to problems and suggests ways for amendment. Through this research, it is envisioned to identify areas in the module that needs to be improved and which may lead to improving the learning of the students.

Statement of the Problem

COVID-19 pandemic forced schools to close doors, resulting in education change dramatically and powerfully impacting the educational setting as shifting student's learning from school to home set happened. Today's education applies adaptive learning methods for learners to ensure continuity of education and protection of learners. Due to lack of access to gadgets or the internet, self-learning modules or printed modules or lessons are preferred as an alternative learning delivery modality.

A learning module is a tool that provides course materials in a logical, sequential order, guiding students through the content and assessments in the order specified by the instructor (UF e-Learning Help, n.d.). Evaluation of the module is vital as it "provides first-hand information to underpin changes to the module that could further enhance module quality and student's experience." It is "fundamental to improving teaching and considering how learning opportunities for students may be improved" (The Quality Assurance Agency for Higher Education, 2018). To ensure quality learning of students, it is a must that modules are adequately checked and evaluated as it sometimes contains errors. In doing so, the study aims to evaluate Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses using the module evaluation criteria checklist and to seek answers to the following questions:
1. Does the Grade 10 module in Uses of Mirrors and Lenses conform to standards in terms of:
    a. quality of content; and
    b. potential effectiveness as a teaching tool?
2. What are the strengths and weaknesses of the Grade 10 module in Uses of Mirrors and Lenses?

Significance of the Study

The results of the study may provide empirical data to the teachers, school heads, and administrators concerning the areas in the module that needed to be addressed. The data gathered may help ensure the continuous and iterative process of producing quality module and teaching methods leading to a more improved learning among the students.

Scope and Delimitation

The study's primary focus is to evaluate an instructional material, specifically the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses, based on the criteria: quality of content and potential effectiveness as a teaching tool. The criteria used are the Module Evaluation Criteria adopted in the study of Goode (2003) entitled "Evaluating the Quality, Usability and Potential Effectiveness of Online Learning Modules: A Case Study of Teaching with Technology Grant Recipients at the University of Tennessee, Knoxville."

This study involved Grade 11 students from a public high school in Calbiga, Samar, who already used the module that was evaluated. The researchers selected Calbiga National High School's students

because it is a school near one of the researchers, and Grade 10 teachers use the module to be evaluated. These factors pose a significant challenge in the ease and fast pace of data gathering.

2. Review of Related Literature ang Conceptual Framework

This chapter presents the related literature and studies related to modular instruction, module evaluation, and module evaluation criteria. Literature that supports the need for evaluation of the DepEd-produced learning modules is also highlighted. Furthermore, this chapter will discuss the theoretical and conceptual framework that guided the entire study process and, lastly, the definition of terms according to how they are used in the study for easy understanding of the key terms.

2.1. Modular Instruction

This academic year (2020-2021), due to the COVID-19 pandemic, instead of attending face-to-face courses, students are studying at home through various methods, including written or multimedia modules, online distance learning, and radio or television-based instructions (Hernando-Malipot, 2020a). However, according to a Department of Education (DepEd) survey, an unstable mobile or internet connection is seen as the top challenge that may affect students' learning through distance learning (Bernardo, 2020). Of 6.9 million parents and guardians who answered the DepEd's Learner Enrollment and Survey Form, 6.9 million responded that their child lacks gadgets or e-learning equipment. At the same time, 6.2 million say they have insufficient load/data allowance (Bernardo, 2020). From these results, 3.8 million learners prefer "modular instruction," wherein printed or digital modules will be an alternative learning option (Hernando-Malipot 2020a). According to Nardo (2017), modular instruction is an alternative instructional design that uses developed instructional materials based on the students' needs. The modular approach encompasses a series of activities, each of which starts with teaching instructions, exercises, explanations, and generalizations designed for the learners.

A module is defined as a self-contained, independent unit of a planned series of learning activities intended to help the student accomplish particular well-defined objectives (Guido, 2014). The module allows students to learn at their rate and recycle if necessary. Modules highlight the analysis and application of concepts and techniques and provide a concrete style of concepts. It also gives students active participation in responding and awaiting to meet individual interest areas and helps the teacher extend more individualized instruction in school and home. Thus, the learner can learn at his rate, choose his preferred learning mode, choose along with various topics, assess his strengths and weaknesses, and recycle if necessary. According to Guido (2014), ideally, modules should contain pre-test, objective, criteria for success, instructional activities, a post-test, and remedial instruction or reinforcement. Modular instruction is based on the psychological principle of learning by doing (Guido, 2014). The learner works by himself and verifies his answers by comparing them with the correct ones. Provision can be given to the students by which the student can obtain immediate feedback.

The DepEd established the Basic Education Learning Continuity Plan (BE-LCP). It covers the essential requirements of education in the time of COVID-19, e.g., Most Essential Learning Competencies (MELCs), and multiple learning delivery modalities for teachers, school leaders and learners, such as blended learning and distance learning. The Undersecretary for Curriculum and Instructions at the DepEd, Diosdado San Antonio, claims that the SLMs, which are aligned with the streamlined K–12 curriculum, are the "backbone" of distance learning, regardless of the modality used (Hernando-Malipot, 2020a). SLM was explicitly created for learners to operate outside of the classroom environment and when lessons are interrupted, reducing face-to-face contact between the learner and the teacher. It was offered to learners as the

primary learning aid to be used in modular distance learning in the new educational set-up. Department of Education (2020) assured that SLMs can be used online or offline for households' gadgets and smartphones. This is because SLMs are printed and distributed to schools in coastal areas, remote regions, and villages lacking connections to the internet or electricity.

2.2. Module Evaluation

According to Bernardo (2021), to ensure the consistency of SLMs used in the modular distance learning modality, the DepEd released guidelines on the assessment of SLMs. Under DepEd Order 001 s. of 2021, which Education Secretary Leonor Briones signed last January 4, 2021, the DepEd released policy recommendations to create a formal assessment process that may lead to the procurement of SLMs for Quarters 3 and 4 for use in DepEd schools in S.Y. 2020-2021 (Hernando-Malipot, 2021).

Based on the DepEd order to evaluate the SLMs, it should encompass content, language, style, and materials design (Hernando-Malipot, 2020b). Beneath the substance, the target Most Essential Learning Competencies (MELCs) per quarter must be correctly projected and that texts and visuals are accurate and error-free. SLMs should be free of grammatical, syntax, spelling, and punctuation errors and are consistent in style. Meanwhile, layout and design seek that the physical attributes, format, and visuals of SLMs are appropriate and well organized (Bernardo, 2021). According to Hernando-Malipot (2020c), several images of inaccurate modules have circulated online since the start of classes on October 5, 2020. Some of these, according to DepEd, were manufactured centrally, while others were produced locally by the regions. DepEd also claimed that specific modules are from "unknown origins" and need further verification.

DepEd revealed that 30 errors were found in the first quarter SLMs for distance learning this school year, 2020-2021. The errors discovered in SLMs were of various types: 20 were factual errors, while seven were numerical or math equation-related errors (Magsambol, 2020b). Furthermore, Nicholls (2021) emphasized that it ranges from factual to typographical, spelling, and grammatical errors. Previous literature specifically in the study of Tan (2019), it is stated that errors in the teaching materials should be corrected so as not to multiply the commissions of mistakes since most teachers and students are dependent on these materials for teaching and learning. In addition, officials from the Department of Education have acknowledged that the materials will not be flawless. One of the reasons for the lapses is a shortage of workforce to manufacture vast amounts of written and video content (Pelayo, 2020). Besides, Nicholls (2021) stated that most of the errors spotted in modules developed by the DepEd field offices did not pass through the central office's quality screening. It is in these reasons pointed out in the literature that lead the researchers to conduct this study.

According to Pawson (2013), evaluation is undertaken to improve policies and implementation further. He suggests that Science can only progress if it learns from one investigation to the next, rather than each inquiry arising fresh from the egg. Module evaluation is essential as it improves teaching and enhances students' learning opportunities (The Quality Assurance Agency for Higher Education, 2018). It allows continuous, repetitive improvement of the module's content and teaching methods; it provides feedback on teachers' quality of education and; aids teachers to understand what approaches students find valuable. According to Academic Practice Department (2019), module evaluation is the main element of quality enhancement. Ensuring high-quality learning tools and services, such as SLMs, will help teachers to better assist and mentor students in mastering their talents, insights, and experiences to succeed in school and life (Hernando-Malipot, 2021). Additionally, module evaluation alerts teachers to problems and suggests ways for amendment to provide quality education.

There are several types of evaluation. One of which is a formative evaluation that aims to improve the program or subject being evaluated. According to Phillips (2013, as cited in Tan, 2019), formative

evaluation examines the curriculum based on its input, content, and process, as well as its learning materials. In this type of evaluation, the evaluator can evaluate the instruments to be used. Data that are not useful for instruction in a curriculum should be revised or eliminated (Dick, Carey, L., & Carey J., 2001). In addition, the developmental evaluation theory of Patton (2012) emphasized that generating feedback and learning is one of the strategies to measure the effect of a program. Similarly, Hattie and Timperly (2007) noted that feedback is one of the most effective influences on learning and achievement as a form of assessment. Furthermore, Race (2000) stated that one of the most critical considerations is feedback when assessing instructional materials.

In the study of Willmot and Perkin (2015), entitled Evaluating the Effectiveness of a First-Year Module Designed to Improve Student Engagement, participated second-year mechanical engineering students have taken part in two evaluation processes of module evaluation. The first evaluation was done through an online survey, and the second process was done in the form of focus group discussion, which provided qualitative and quantitative data. Data retrieved were used to identify any module areas where improvements could be made to enhance the learning experience.

Similarly, in the study conducted by Lim (2015) entitled, Student Evaluation of Engineering Modules for Improved Teaching-learning Effectiveness, student respondents evaluated module with the use of a Student Evaluation of Module (SEM) questionnaire, in which the rating is given according to how much one agrees with a statement. The analysis for this alternative SEM is dependent on the percentage of students agreeing with an idea. Students only select answers relevant to them through the list of choices for every question. The main reason for adopting the "percentage of students" method is to minimize the subjectivity of opinion present when a rating scale is used.

2.3. Module Evaluation Criteria

Quality of Content. A content module is a set of highly coherent content categories. It refers to how well the content achieves its goals (Gibbon, n.d.). He added that content quality goes beyond information to include formatting, readability, and grammatical correctness. Similarly, Cohen (2016) described content quality as adding value, solving a problem, being well-written, and telling a story. However, fundamentally, the content's consistency is dictated by the audience and their opinions. It is about giving them what they need in a manner that will relate to their lives.

DepEd maintained that all self-learning modules distributed to millions of students underwent quality assurance inspection despite a few errors in educational materials (Cellona, 2020). DepEd specified in terms of content that the target MELCs per quarter are sufficiently protected, that the instructional architecture and organization are compatible, and the text and graphics are correct and error-free and that adequate evaluation for learning is included. Third-party content should be appropriately cited and referenced, and readability should be ensured (Hernando-Malipot, 2021). Moreover, ALS-EST Handbook (2019) discussed that modules/handouts should be of good quality – clear, readable, and presentable – not reduced. Adison (2020) indicated, even as students struggle to understand the contents of the modules, some parents also cannot teach their children. Since the subjects are conducted remotely, the content would be a concern. He further added that students would adapt to the new learning modalities, but it is not sure if they will absorb the lessons properly. Hence, the modules must have quality assurance. Quality assurance should be implemented consistently in learning materials' design development and production process to ensure high-quality products (Mutiara, 2006).

Since distance learners rely heavily on learning materials as a primary content source, the methodological and empirical instructional design principles should be carefully considered in designing, implementing, and creating learning materials. Quality learning materials are highly focused on the rigorous

execution of quality assurance standards. In the study of Goode (2003), she used the following factors in evaluating the quality content of a module: (a) has clear and concise directions on how to complete the module, (b) adequately sequenced, (c) has accurate content, (d) detailed enough for a student to progress through the instruction without a teacher, (e) provides a complete demonstration of concept, (f) provides opportunities to practice new concepts and skills, (g) provides detailed and appropriate feedback for the practice opportunities, (h) provides consistent feedback, (i) can be shared across its subject area and others, (j) instruction follows a logical hierarchy of skill and knowledge development, (k) content and text font are easy to read (appropriate size, color, and style), (l) content and text are written, (m) content engages the learner, (n) graphics match content, and (o) abbreviations and references are consistent. The criteria mentioned above are adopted in the module evaluation checklist for this study.

2.4. Potential Effectiveness

Effectiveness is the ability to be successful and produce the intended results ("Effectiveness," n.d.). Similarly, in an educational context, UNESCO (2020a) defined effectiveness as an output of specific evaluation that measures the achievement of a particular academic goal to which an educational institution can be expected to achieve specific requirements. It refers to achieving desired result or outcome. In this study, potential effectiveness will be used as one of the criteria for module evaluation. In measuring a learner's module's effectiveness, Goode (2003) used the following criteria: (a) has clear and concise learning objectives, (b) identifies prerequisite knowledge, (c) contains activities, practices, or quizzes that reinforce the content, (d) offers timely and relevant feedback, (e) build on prior concepts, (f) demonstrates relationships between concepts, and (g) very efficient (one can learn a lot in a short period of time). Those mentioned above are the same criteria used in the module evaluation criteria checklist for module potential effectiveness in this study.

Theoretical and Conceptual Framework

This study is anchored in a particular theoretical framework, which is the Developmental Evaluation theory. Coined by Patton (2012), the Developmental Evaluation theory suggests that one of the methods to measure and evaluate the effect of a program is to generate feedback. The feedbacks from the learners are used as part of the evaluation of learning materials for some open improvements. According to Gordon (2010), a logical way to evaluate the quality of learning materials is to try them out on learners and get their feedback. Thus, in this study, evaluation feedback from the respondents about the quality of Grade 10 Quarter 2 –Module 4: Uses of Mirrors and Lenses, in the dimensions Quality of Content and Potential Effectiveness as a Teaching Tool, are essential data sources for this study.

In line with the context of the theory outlined above, the researchers developed a conceptual paradigm illustrated in Figure 1 which helps visualize the entire study.
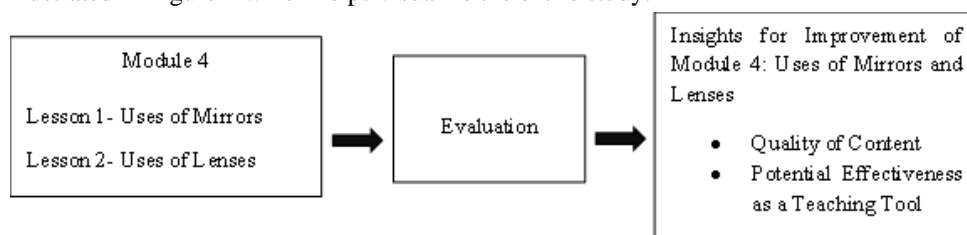

Figure 1. Conceptual Framework of the Study

As shown in Figure 1, the researchers used the DepEd-issued Grade 10 Quarter 2- Module 4: Uses of Mirrors and Lenses which is composed of two lessons, Lesson 1- Uses of Mirrors and Lesson 2- Uses of

Lenses, as the subject for the evaluation. The module was evaluated using the researcher's modified module evaluation checklist that focuses on the quality of content and the potential effectiveness as a teaching tool. The results lead to insights based on empirical data that may be used to further improve the aforementioned module.

Definition of Terms

The following terms are defined for clarity and a better understanding of the study.

Evaluation. In this study, it pertains to the process of evaluating the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses based on the three main dimensions- Quality of Content, Usability, and Potential Effectiveness as a Teaching Tool.

Potential Effectivenes.: In this study, the potential effectiveness pertains to the dimension, highlighting the learning material's capability to improve the teaching and learning using the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses.

Quality of Content. In this study, it refers to the dimension that evaluates the educational significance of the contents of the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses.

Self-Learning Module. In this study, it pertains to the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses used in teaching and learning for the Grade 10 students in distance learning.

3. Methodology

Research Design

The study employed a descriptive evaluative research design. According to Fluet (2021), one objective of descriptive research design is to describe or measure specific characteristics or perceptions. Widayanthi, Simpen, and Udayana (2019) stated that evaluative research functions as an assessment of the benefits and quality of products or results of the process. Moreover, evaluation research is descriptive research directed at determining whether or not a particular program has achieved its goals (Syafitri, 2015). This research design is well-suited with the present study, which aims to evaluate the quality of content and potential effectiveness as a teaching tool of the Grade 10 Science Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses and describe its strengths and weaknesses.

Research Locale

The study was conducted at Calbiga National High School, a DepEd managed secondary school located in Brgy. Macaalan, Calbiga, Samar. Calbiga National High School offers Basic Education Curriculum (BEC). It is also one of the secondary schools in Samar Division that offers Science Technology and Engineering Type B (STE-B) program. The students in this school are being taught using the modular mode of instruction.

Research Participants and Sampling

The research was participated by the Grade 11 students of Calbiga National High School, Calbiga, Samar. These students were chosen as participants of the study because they already utilized the module to be evaluated.

The total number of the target population is 129. Using Krejcie and Morgan (1970) in determining the sample size, the recommended sample size is 97 (pp. 607-610). In determining participants, purposive sampling was used based on the following criteria: (a) living in the area near the place where researchers will conduct the research study; (b) have access to the internet; (c) availability of the student in the specific time of conduct of the study; and (d) have the willingness to participate and evaluate a module.

Research Instrument

The researchers adopted and modified a module evaluation criteria checklist (see Appendix B) from a dissertation entitled Evaluating the quality, usability, and potential effectiveness of online learning modules: A case study of teaching with technology grant recipients at the University of Tennessee, Knoxville by Goode (2003). A permission letter (see Appendix C) was sent to the author to use and modify her instrument. Some parts of the adopted Module Evaluation Criteria checklist were removed to align the data gathered to the study's research question. From a total of 3 criteria, the study used only two (2). The two remaining parts from the adopted research instrument, the checklist on the dimensions: quality of content and potential effectiveness as a teaching tool, was used in the study. Also, some of the statements in the checklist were changed due to choices of words, and a 6-point Likert scale was changed to a 4-point Likert scale. Likewise, the Likert scale order was reversed, ranging from 4-1 ratings to 1-4 ratings since it has been most recommended that it would reduce the frustration level of respondents and increase response rate and response quality (Sachdev & Verma, 2004).

The modified module evaluation checklist consists of four parts.

Part I is a questionnaire designed to gather participants' profiles. This includes the name (optional), sex, age, strand, contact number, and the date on which the respondent accomplished the checklist.

Part II is a specific module evaluation checklist to be answered using the 4-point Likert scale, with 1 "Strongly Agree," 2 "Agree," 3 "Disagree," and 4 "Strongly Disagree." This part is designed to determine the specific evaluation of the participants in Grade 10, Science Quarter 2-Module 4 regarding the quality of content and potential effectiveness as a teaching tool.

Part III is an observation and comments-suggestions to the totality of the module that consists of possible responses for the strengths and weaknesses observed by the participants and open comments/suggestions. This part is designed to know the recommended changes in the totality of the module.

Among the self-learning module produced by the Department of Education for Grade 10 Science, the researchers chose Quarter 2 Module 4 entitled, Uses of Mirrors and Lenses (see Appendix A) because it is the only module for Quarter 2 that consists of two or more lessons. Thus, it is not limited to evaluation. The lessons that were evaluated are as follows:

a) Lesson 1- Uses of Mirrors

This topic can be found on pages 4-9 of the Grade 10 Science module for Quarter 2 entitled, Uses of Mirrors and Lenses. This topic in the module teaches students about the proper uses of the mirror. It will help students know the best mirrors they are going to use.

b) Lesson 2- Uses of Lenses

This topic can be found on pages 9-16 of the Grade 10 Science module for Quarter 2 entitled, Uses of Mirrors and Lenses. This topic in the module teaches students about the uses of lenses in many things.

Validation of Instrument

The modified module evaluation checklist has undergone content validation. The researchers consulted three faculty validators to assess the validity of the instrument (see Appendix D) because Lynn (1986) advised that a minimum of three experts are needed for Content-Validity Instrument (C-VI) but stated that greater than ten (10) is probably not needed. The three faculty validators are one instructor and two professors from the Science Unit of Leyte Normal University. The researchers conducted a pilot test on the 30 selected Grade 11 students of Calbiga National High School who are not part of the participants' research study. It is widely accepted that 30 to 100 pilot participants are enough for the pilot test, but this number will vary depending on the number of respondents of the entire sample (Courtenay, 1978). In conducting the pilot test, the researchers administered a module evaluation checklist to the participants. In determining the

reliability of the module evaluation checklist, the researchers used Cronbach's Alpha Coefficient. If the results obtained .00, it means no consistency in measurement of the instrument, while if the results got 1.00, it indicates perfect character in size. However, the acceptable range is between 0.70 and 0.90 or higher, depending on the type of research (Olaniyi, 2019). From the results, it can be gleaned that there were high results in all of the areas considered for assessment. The overall result of 0.92 was interpreted as High Reliability (see Appendix E). This means that the instrument has achieved the consistency of responses from the respondents across all conditions given for each category of assessment, and as such, its reliability is established. Thus, it was determined that the instrument was ready to use for actual respondents.

Data Gathering Procedure

Prior to the actual data collection procedure, a pilot-testing of the research instruments was conducted. The researchers secured a necessary permit (see Appendix F) to conduct pilot testing, which was addressed to the principal of Calbiga National High School. Once approved, the researchers coordinated with the advisers of Grade 11 students. A copy of the list of students' names and their contact information was asked from the advisers (e.g., FB account and cellphone number). Before disclosing the contact information of the students, the researchers first requested for the advisers to ask permission to their advisory class to disclose their contact information to the researchers. The contact information needed by the researchers was limited only to a Facebook account and cellphone number. The said information helped the researchers to have accessible and faster communication with the participants. After the request was granted, a Messenger group chat was created. The members of the group chat include the researchers and the chosen 30 students for the pilot testing. There, the Module Evaluation Criteria Checklist subject for pilot testing was uploaded. The students were given one day to complete the checklist. The pilot testing was conducted to ensure that the research runs smoothly and to help improve the output from the study (Wright, 2021).

Once the reliability of the research instrument was ensured, the researchers sent a request letter (see Appendix G) to conduct the research study addressed to the principal of Calbiga National High School through email. After the request to conduct the study was secured, the researchers again created a group chat comprising the remaining target participants who were not part of the pilot testing. There, an informed consent form (see Appendix H) was uploaded. Stated in the consent form is the purpose of the study, the role of the participants in the conduct of the research, the time required to complete the questionnaire, the benefits for participating in the study, probable risks (if there are any), and how the researchers will ensure confidentiality to the data shared by the participants. They were given 1 to 3 days to decide whether to accept or decline the request. Target participants who agreed to the terms mentioned in the consent form and were willing to participate were asked to fill up the consent form and submit it through Gmail. The evaluation process was done online since face-to-face interaction is restricted due to the government-issued health protocol in line with the continued rise of COVID-19 cases in the country.

After securing the consent forms, the researchers eventually conducted the actual data gathering procedure. Grade 10 Science Quarter 2 Module 4: Uses of Mirrors and Lenses and a Module Evaluation Criteria Checklist link were uploaded in the same group chat. The SLM was in portable document format (PDF), while the module evaluation was in a google form. The participants were given three days to evaluate the module and complete the module evaluation questionnaire. After all the participants have submitted their responses, analysis and interpretation of the data commenced.

Analysis of Data

According to Cohen (2016), data analysis "is important as it has a specific bearing on the form of the instrumentation," as it makes sense of the data before presenting it. It is done after the data are gathered. The study used a module evaluation checklist for students in evaluating the module, making it quantitative

research. The data collected in the study from the checklist response consisting of two (2) parts, a 4-point Likert scale, were carried out through descriptive analysis. Descriptive analysis is used to analyze the data gathered from the checklist. It is a "statistical method used to search and summarize historical data to identify patterns or meaning" (VALAMIS, 2019). From the analyzed data of participants' evaluation, researchers identified the meaning or participants' point of view if the module is well-constructed or not. The data were taken in Part IV of the questionnaire. In this open-ended question, the students wrote comments-suggestions to the totality of the module and the strengths and weaknesses observed by the participants.

Data gathered from the checklist were analyzed using descriptive statistics such as frequency, percentage, and weighted mean. The means for the quality content and potential effectiveness as a teaching tool were interpreted as follows: Strongly agree in the point range of 1.00 – 1.49, Agree 1.50 – 2.49, Disagree 2.50 – 3.49, and Strongly disagree 3.50 – 4.00 (see Table 1). Lastly, the recommendation from the students as the module evaluators were collated and summarized to come up with a simplified and complete thought of recommendation for further improvement of the module.

Table 1. Likert Scale Interval and Interpretation of the Quality Content and Potential Effectiveness as a Teaching Tool

Likert Scale Interval	Likert Scale Interpretation
3.50 – 4.00	Strongly disagree (SD)
2.50 – 3.49	Disagree (D)
1.50 – 2.49	Agree (A)
1.00 – 1.49	Strongly agree (SA)

Ethical Considerations

To acquire the learning materials for the evaluation, the researchers wrote a formal request letter addressed to the principal of Calbiga National High School to allow the researchers to access the learning as mentioned above material (see Appendix I).

According to Nijhawan, et al. (2013), informed consent is an ethical and legal requirement for human participants' research. It is the process where a respondent is informed about the research vital for the participant to decide to be part of the study. Henceforth, the participants were given an informed consent form to fill up before choosing to participate in the research before answering the research checklist. The researchers' information was also presented along with the consent form for further queries and concerns. After the participants approved to participate, they received a copy of the learning material and questionnaire. The questionnaire contains optional inputs regarding the participants' identities. The researchers also assured that all the information given by the participants will be treated with utmost confidentiality, strictly observing the provisions of Republic Act 10173 Data Privacy Act of 2012.

4. Results and Discussion

This chapter illustrates the statistical data gathered in this study. The researchers identified the profile of the participants and their evaluation on the Grade 10 Science Quarter 2 Module 4 in terms of its quality content and effectiveness as a teaching tool, as well as their strengths and weaknesses using the frequency counts and average weighted mean as statistical tools. Results presented serve as the basis in the overall evaluation of the module.

4.1. Sex of Respondents

Table 2. Sex Distribution of the Respondents

Sex	Frequency	Percent
Female	57	59%
Male	40	41%
Total	97	100%

Table 2 shows that females with 57 (59%) participants outnumbered men, with 40 (41%) participants who answered the module evaluation checklist. Therefore, the majority of the participants in the conduct of the study are female.

4.2. Age of Respondents

Table 3. Age Distribution of the Respondents

Age	Frequency	Percent
16-20 years old	94	97%
21-25 years old	2	2%
26-30 years old	1	1%
Total	97	100%

Table 3 conveys that 94 (97%) out of 97 participants are between the ages 16 to 20 years old, 2 (2%) of the participants are between the ages 26 to 30 years old, and only one (1%) belongs to the ages between 26-30 years old. This indicates that the majority of the students are between 16 to 20 years old.

4.3. Senior High School Academic Strand of Respondents

Table 4. Senior High School Academic Strand Distribution of the Respondents

Strand	Frequency	Percent
Science, Technology, and Engineering (STEM)	34	34%
Accountancy, Business, and Management (ABM)	24	25%
Humanities and Social Sciences (HUMSS)	21	22%
General Academic Strand (GAS)	18	19%
Total	97	100%

Table 4 reveals that most of the study's participants are from the STEM strand with 34 participants (34%), followed by the ABM strand with 24 participants (25%), and the HUMSS strand with 21 (22%) participants. The least number of participants are from GAS with 18 participants (19%). Thus, the majority of the participants are STEM students.

4.4. Evaluation on the Quality Content of Science DepEd Learning Module

Table 5. Quality Content Evaluation of Grade 10 Science DepEd Learning Module

Dimension	Frequency Count	Percent	Total Weighted Mean	Verbal Interpretation

Quality Content of the Module	97	100	1.76	Agree

Table 5 shows that all the items got the verbal interpretation of Agree. Based on the findings, this indicates that all Grade 11 students agreed that the Grade 10 DepEd learning module on Uses of Mirrors and Lenses assures quality content. This further implies that the module contains in-depth information and conforms to the following traits: accuracy, completeness, reliability, definite formatting, readability, and grammatical correctness. Furthermore, the results agree to the statement of DepEd that in terms of content, the target MELCs per quarter in each module are sufficiently covered, the instructional design is aligned, the text and graphics are correct and error-free, and adequate evaluation for learning is included (Hernando-Malipot, 2020b). Similarly, the findings are congruent to the statement in ALS-EST Handbook (2019) that modules or handouts should be of good quality – clear, readable, and presentable – not reduced.

4.5. Evaluation on the Potential Effectiveness as a Teaching Tool of DepEd Science Learning Module

Table 6. Potential Effectiveness as a Teaching Tool Evaluation of Grade 10 Science DepEd Learning Module

Dimension	Frequency Count	Percent	Total Weighted Mean	Verbal Interpretation
Potential Effectiveness	97	100	1.71	Agree

Table 6 presents the evaluation on the potential effectiveness as a teaching tool of the DepEd Science learning module with a descriptive rating of agree. The findings imply that the students can use the module as an alternative tool for teaching and learning. It provides course material logically, sequentially and guides the students through the content and assessment. The findings confirm the statement of Sadiq (2014), that the modular approach is widely used at various levels since it is more effective in the teaching-learning process than ordinary teaching methods. In this modular approach, the students learn at their own pace and in a short period. It is also a free self-learning style in which immediate reinforcement and feedback are provided to practice exercise, motivating the students and creating interest in them.

4.6. Strengths of the DepEd Science Learning Module

Table 7. Strengths of the Grade 10 Science DepEd Learning Module

Strengths	Number of Respondents	Percent
Easy to understand	41	42%
Well organized or well structured	28	29%
Engaging	15	16%
Clear learning objectives	7	7%
Clear and relevant graphics/illustration	3	3%
None	3	3%
Total	97	100%

Table 7 shows that 42% (41) of the respondents find the module easy to understand and comprehend. This entails clear instructions, detailed examples, and explanations in the module which meet one of the criteria that Goode (2003) used in his study. Based on the findings from the online survey conducted by the researchers, aside from the module being easy to understand, 29% (28) of the respondents also answered that

it is well organized and well-structured, which complimented the statement of Bernardo (2021) that the layout and design seek that the format and visuals of SLMs are appropriate and well organized. In addition, 7% (7) of the respondents noted that the module has clear learning objectives and the remaining 2% (3) noted that the module contains relevant graphics and illustrations.

4.7. Weaknesses of the DepEd Science Learning Module

Table 8. Weaknesses of the Grade 10 Science DepEd Learning Module

Weaknesses	Number of Respondents	Percent
None	47	49%
Hard to understand	31	32%
Unarranged and missing pages	5	5%
Answer key (Answers are already given)	4	4%
Repetitive questions/activities	3	3%
Too many activities	3	3%
Typographical errors	2	2%
Demanding in load allowance	2	2%
Total	97	100%

Table 8 presents the weaknesses of the module. This table shows that almost half of the total number of respondents, 49% or 47 students, noted no flaw in the module. Despite the large number of respondents who answered none regarding the weakness of the module, 32% of the participants find the module hard to understand, this is connected to the unclear instructions and lack of content information. The modules contain numerous and repetitive activities (3%) as well as typographical and grammatical errors (2%), which confirm the statement of Nicholls (2021) that errors found in the module range from factual to typographical, spelling and grammatical errors. The respondents also noted that some activities in the module require cellphone load allowance which is a common problem faced by the students as well as the parents. In fact, according to the survey conducted by the Department of Education, 6.2 million out of 6.9 million parents and guardians who answered the DepEd's Learner Enrollment and Survey Form, say they have insufficient load/data allowance (Bernardo, 2020).

4.8. Comments and Suggestions on the DepEd Science Learning Module

Table 9. Comments and Suggestions on the Grade 10 Science DepEd Learning Module

Comments/Suggestions	Frequency	Percent
None	44	45%
Activities should align with the learning objectives	14	15%
Instructions should be more detailed	14	15%
The module should contain all the information about the topics or lessons needed in order to answer the module (links for the additional information).	10	10%
Enhance the quality of the texts and increase the size to make them easier to read and see.	4	4%

Complete and arrange the pages of the module	3	3%
Lessen the activity	2	2%
Remove answer key	2	2%
The module should include a visual representation/illustration of the topics	2	2%
Avoid duplication of activities.	1	1%
Simplified explanation of concepts	1	1%
Total	97	100%

The table shows the comments and suggestions of the respondents and the majority of the respondents, 45% or 44, answered that the module is already good and needs no further improvement. The 15% or 14of the respondents suggested that the module should have clear and precise instructions which are the first of the criteria that Goode (2003) used in his study in evaluating the quality of the module. Another 15% of the total number of respondents recommended that the activities should align with the learning objectives which is also one of the criteria that Goode (2003) used in his study in measuring a module's effectiveness. In addition, 10% or 10 of the respondents also pointed out that the module should contain enough information to fully understand the lesson and include the links for the additional information and topics. Four of the respondents (4%) recommended the enhancement of the quality and size of the texts so that it is easier to read and see and this suggestion compliments the statement of Hernando-Malipot (2021) that the readability of the module should be ensured. Moreover, ALS-EST Handbook (2019) discussed that modules/handouts should be of good quality – clear, readable, and presentable – not reduced. 3% of the respondents suggested to complete and arrange in order the pages of the module. Removal of the answer key is also suggested by the respondents (2%). 2% of the respondents suggested the inclusion of visual representation or illustrations of the topics so that the students will be able to visualize their structure. Another 2% of the respondents suggested to lessen the number of activities. Respondents suggested to simplify some terms and topics and they also commented about the duplication of activities.

5. Summary of Findings

This section summarizes the main research findings of the study. In the study, there are a total of 97 participants comprising 57 female and 40 male students. Almost all of the participants are between the ages of 16-20 years old. The students who dominated the participation of the study are Science, Technology and Engineering (STEM) students with 34 in total, and the rest belong to other academic tracks.

The study's primary objective is to seek answers if the Grade 10 module in Uses of Mirrors and Lenses conform to quality content standards and an effective teaching tool and its strengths and weaknesses. For the quality content of the module, a lot of participants strongly agree that the evaluated module is organized, has clear and concise directions on how to complete the module, has accurate content, and has no spelling errors. However, few participants disagree that the module is detailed enough for a student to progress through the instruction without a teacher, provides detailed and appropriate feedback for the practice opportunities, and contents are easy to understand. For the potential effectiveness of the module as a teaching tool, numerous participants strongly agreed that the module has activities, practices, or quizzes that reinforce the content and that it has clear and concise learning objectives. Few disagree that the module can be an efficient learning material (one can learn a lot in a short period of time) or an effective learning tool.

A lot of students refuse to give comments and suggestions for the improvement of the module. According to the Academic Practice Department (2019), students less likely want to provide feedback because they feel like they are not benefiting from it or simply unwilling. There are some who suggested that

instructions in the module should be more detailed, activities should align with the learning objectives that were stated, and that the module should contain all the information about the topics or lessons needed to answer the module.

6. Conclusion

Upon considering the results, this paper concludes that based on the evaluation of the content quality of the Grade 10 Science Module: Uses of Mirrors and Lenses, the participants agreed that the module conforms to the standards of accuracy, completeness, reliability, standard formatting, readability, and grammatical correctness. This also indicates that the module is anchored to the intended learning outcomes or MELCs as instructed by the Department of Education. As for the effectiveness as a teaching tool, the module is considered adequate based on students' responses. This shows that the module is perceived by the participants to be an alternative tool for the teaching-learning process. Furthermore, this paper concludes that the respondents are satisfied with the module's overall quality.

This study also presents several strengths and weaknesses of the module. The module strengths include the following, the module is easy to understand, well-constructed and organized, engaging, has clear objectives, and has appropriate illustrations or pictures. However, the weaknesses identified in the module include being dominantly hard to understand, containing too many repetitive activities, and minor spelling and grammatical errors. The results based on the participants' responses also conclude that the module is good but needs some corrections or revisions on instructions, alignments of more "fun" activities to the learning objectives, and lacking information. These are all based on the students' comments and suggestions. Some suggestions revolve around the appearance, organization, and removal of some parts of the module itself, e.g., answer key. Overall, the Grade 10 Science Module: Uses of Mirrors and Lenses has a good quality of content and is effective as a teaching tool.

7. Recommendations

Despite the details of the results, which show that the Grade 10 Science Module: Uses of Mirrors and Lenses, being a quality material that assures good quality of content and effectiveness of the material as a teaching tool, the weaknesses and comments/suggestions of the respondents are also necessary to improve the overall quality of the module further. In light of the data presented above, the researchers wish to recommend, which is taken into consideration, that might bring some positive changes to the current quality of the learning modules to ensure quality learning for students.

1. For the module's overall quality, based on the results, this study suggests conducting thorough revisions for the module, which should be focused but not limited to; level of the module to be understood by the students, organization of the module for unarranged and missing pages, clarity of instructions, questions and activity redundancies, alignment and number of activities, typographical and grammatical errors.

2. This study also suggests that the answer keys on these modules should be taken into consideration of removal to maximize the students' capacity to answer independently and conduct extensive readings or further study to evaluate their answers. Teachers' feedback or ratings on this matter can also be considered an alternative instead of the answer key.

3. The study's results also suggest that the Department of Education may release an order for schools to conduct school-based evaluation or further inspection of modules to be participated by the school heads and teachers before it will be given to students to maximize the quality of the materials, minimize the errors and modify if necessary.

4.   This study has highlighted some practical aspects that could be pursued further by researchers and people of authority in education. The results suggest that all modules should be evaluated by student users for further improvements

5.   This study also recommends evaluating other modules produced by DepEd, focusing on the module's effectiveness as a teaching tool using assessment results. Assessment results are essential for improving the modules as an alternative teaching-learning tool.

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