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Research Article

Development and Evaluation of Learning Resource Package in Optics for Grade 10 Science

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ABSTRACT

Learning complicated topics in Physics is one of the most challenging tasks students experi-ence in the classroom. Physics teachers use supplementary materials and laboratory exercises to help students visualize and imagine what they are studying in order to better understand the topics. These learning aids, however, are sometimes not sufficient. Students would still struggle to learn due to lack of effective teaching materials. Without effective teaching materials, it is impossible to master Physics concepts. The study focused on developing and evaluating a learning resource package in Optics for Grade 10 Science. The results showed that the resource package will provide an effective and alternative method for students to be exposed to the scientific method and to explore and observe what the beauty of physics does in our lives. These are very helpful for teachers when teaching Physics concepts. Furthermore, because the learning resource package is already complete, the teacher may feel more prepared to teach optics classes. It is recommended that teacher-writers create lessons that are similar to those already used in science classrooms which may directly address the needs of students.

Keywords: *classroom instruction, learning resource development, physics teaching*

Introduction

Physics is a science subject that most Filipino learners find difficult to understand. This results in a low student achievement rate in the subject, which is usually associ-ated with the close interplay of ideas and experiments, something that the science classroom, physics, in particular, needs to address (Ocampo et al., 2015).

Due to the abstract nature of the subject, the teaching of physics in schools has not been encouraging. That is why instructional materials are important to facilitate students learning of physics. Mastery of physics concepts, as most

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educators emphasized, cannot be attained without the use of instructional materials.

Setting up an adequate Physics laboratory is expensive. Many fundamental experi-ments require pieces of equipment that are very expensive commercially. With this challenge in mind, Deauna (1990) sug-gested that the manufacture of equipment using locally available materials be en-couraged and supported to address the lack of budget for the needed laboratory materials. Also, Simpson (1992) claimed that teaching apparatus need not be highly sophisticated to illustrate science concepts. He added that simply using locally made apparatus enables the students to understand the basic principles easily and makes them aware that scientific principles applied to everyday things are not associated with special apparatus, making study less intimidating. Hence, this research on the development and evaluation of a learning resource package in Optics, a physics content in Grade 10 Science is conceived.

As prescribed by the K to 12 science cur-riculum, science content and science pro-cesses are intertwined. Rather than solely relying on textbooks, teachers are encour-aged to perform varied hands-on, minds-on, and hearts-on activities that will develop students' interests and let them become active learners.

Statement of the problem

This study aimed to specifically answer the following questions:

1. What are the topics in Optics that can be developed as learning resource package for Grade 10 Science based on the Curriculum Guide as prescribed by the Department of Education?
2. What are the Science teachers and expert respondents' evaluation on the following components of the developed learning resource package in Optics for Grade 10 Science?
   a. Daily Lesson Log (DLL) Exemplar
   b. PowerPoint Presentation
   c. Optics-Kit
3. Is there a significant difference in the evaluations of the two groups of respondents on the developed learning resource package in Optics for Grade 10 Science?
4. What comment/suggestions are offered by the respondents to further improve the developed learning resource package in Optics for Grade 10 Science?

Significance of the Study

Science Learners. Science learners would greatly benefit from the study because they will be the direct recipients of the skills and competencies that would be developed through the use of the learning resource package in Optics. The enhanced science instruction would develop their interest towards the subject and eventually make them active learners and achievers.

Science Teachers. Science teachers would benefit from the study since they would be provided with a research-based instructional material which they could utilize in their respective science classes particularly those who handle Grade 10 Science.

Parents. Parents would also benefit from the study since they would be assured that quality instruction is attained through the use of customized instructional material that would directly address their children's needs in learning the nuisances of science particularly Optics.

School Administrators. School administrators would benefit from the results of the study since the materials developed may be adopted as part of the school's learning material repertoire. It could contribute to the overall success and accomplishment of the school through improved students' achievement and increased proficiency.

Other Researchers. Other researchers working on the development of instructional materials in science teaching could use the information provided in this study as a point of reference or as a secondary source of information for their personal researches.

Scope and Delimitation of the Study

This study was limited to the development and evaluation of a learning resource package in Optics for Grade 10 Science at District II, Schools Division Office-Marikina, Marikina City during the school year 2018-2019.

The researchers used the Curriculum Guide (CG) for Grade 10 Science as prescribed by the Department of Education (DepEd) in identifying the lessons in Optics which were included in the development of the learning resource package.

The developed learning resource package was evaluated by twenty (20) Science teachers and fifteen (15) Science experts from District II, Schools Division Office (SDO) - Marikina, Marikina City.

Validation of the learning resource package was not done in this study due to time constraint.

Review of Related Literature and Studies

Various references that have a direct relevance to the present study were read and scrutinized in order to gain a deeper understanding and broader view of the topic under study. Some of these literature and studies were discussed herein.

Related Literature

Instructional materials are very important because what students hear can easily be forgotten but what they see cannot be easily forgotten and last longer in their memory. In contribution of Abimbola (1999) to the importance of instructional materials to teaching and learning process, he pointed out that the primary purpose of instructional materials is to make learning more effective and also facilitate it. He averred also supported that teacher would not be able to do much where these materials are not available; therefore, improvisation become necessary.

Ocampo et. al (2015) believed that hands-on and minds-on activities are important to maximize learning abstract concepts. This is further supported by Dale's Cones of Experience which purports that people generally remember ninety percent of what they say as they do a thing, that is, active. As the students "do the real things", they are able to learn. As Kolb (1984) believed, knowledge results from the combination of grasping and transforming experience.

Since the development of science in general and Physics in particular heavily relies on observation and experimentation, its learning must also be accompanied by them (Ocampo et. al, 2015). Similarly, Torres (1994) in his book Learning Excellence mentioned that the best way to learn is to involve the students in actual applications of theories, principles, and concepts. The more senses that are involved in the teaching and learning process, the better the outcome. Every aspect of the learning process should be learned concretely through examples, exercises, hands-on activities and practical applications were being highlight. (Arevalo et. al, 2006).

For his part, Gagne (2005) articulated in his theory that a teacher cannot be certain if students learn unless they perform the task assigned to them. This is supported by Carpenter and Minnix (1993) who claimed that teaching Physics concept using instructional materials is a very effective way to combat the Physics-is-too-difficult syndrome. Therefore, physics teaching, particularly in the basic education level, must be accompanied by activities that demonstrate concepts and experiments that verify or even discover important principles in nature.

Finally, in this age of Information and Communication Technology [ICT], teachers must be able to use available local resources to produce instructional and learning materials in schools (Daniel, 2001). Participating in the improvisation of instructional materials exposes learners to creativity, innovation and curiosity, all of which are fundamental to teaching and learning of Science (Adeniran, 2006). It can also be noted that Improvisation in Science teaching is an important issue in Science Education which has attracted a lot of contributions from Science teachers.

Related Studies

There are a number of studies in Science instruction which are being conducted by various individuals and institutions. Topics range from theory generation and testing to materials development, evaluation and validation, all aiming towards coming up with a better perspective in Science education. Some of them were reviewed and scrutinized to find some links that may lead the researchers towards

discovering ways as to how the present study will be best structured and presented.

One study which features could be interestingly noted was that of Muñoz (2014) entitled, "Development and Evaluation of Learning Package in Physics". The study aimed to develop a learning package in Grade 9 Science capitalizing on the least mastered skills. Selected Physics experts and teachers from the Division of Makati City, Division of Manila City and Division of Marikina City served as evaluator respondents. The study revealed that there is no significant difference between the evaluations of the Physics experts and the Physics teachers on the developed learning package in terms of cost, design, flexibility, functionality, and suitability but significant in terms of durability.

The study of Muñoz (2014) is similar to the current study as it also proposed to develop and evaluate an instructional material in science. The research method, data gathering procedure, and instruments used are also relatively similar as well as the subject area focus. The difference is on the selection of the topic to be included and the format of the questionnaire. The topics in the current study were based on the Science 10 Curriculum Guide while the previous study selected topics based from the perception of the Science teachers. Moreover, the study of Muñoz focused only on the hands-on package which consists of simple experiments or activities on the selected topics. Meanwhile, the present study has three important components: the DLL exemplar, the PowerPoint presentation, and the optics kit, where students could have hands-on experience.

Cruz (2018) attempted to develop and evaluate a laboratory manual in Grade 7 Chemistry, which could play a significant role in conceptualizing the current study. Topics for the laboratory activities adapted in the preparation of the proposed manual were based on the summative assessment conducted. The respondents found the developed laboratory manual to be organized, clear, comprehensive, appropriate, and useful.

Some features of the study "Development and Evaluation of Contextualized Teaching and Learning Materials in Physics" conducted by Rico (2018) also caught the attention of the researchers. In Rico's research, he focused on Grade 10 Science (Physics component) and included 10 topics based on the preference of the Science teacher respondents in the development of the contextualized teaching and learning material. The developed material received a Very Good evaluation from the six (6) experts and 30 teacher evaluators and found no significant difference in the means. Furthermore, it was given commendable comments.

Similarly, the study of Arguilles (2015) showed that the developed and evaluated laboratory manual on Natural Science 211 (General Chemistry) is effective as it received Strong Agreement from the evaluator respondents. It revealed that the laboratory manual poses promising features and there was no significant difference in the means of the evaluators.

Also, it is imperative to account or identify some learning needs which have been overlooked which come out to the fore as a result of students' works. This was addressed by Ocampo et. al (2015) who conducted a study that aimed to construct manipulative materials/tools/equipment useful in enhancing understanding of least learned concepts and in acquiring least learned skills in Physics. The lab kit was evaluated by both science teachers and students at Philippine Normal University Laboratory School. The material was said to have conformed to the principles of instructional materials development.

Another study that captured the researchers attention was that of Delmindo (2015). The study was conducted to develop and evaluate an e-module in Physical Science and sought the perception of the respondents on its comprehensibility, clarity, usefulness, and technical quality. The developed material was perceived effective as shown by the high ratings and favorable comments it received.

The rationale of the current study is similar to the above study that is to develop a material that would result towards achieving meaningful learning. They differ on subject matter focus as the former is a material intended for Grade 8 whereas the current study is for Grade 10 Science, specifically Optics. Another difference is

on the criteria used; the former sought the perception of the respondents based on its comprehensibility, clarity, usefulness, and technical quality while the current study asked respondents to evaluate the material based on its parts: DLL, Powerpoint, and Optics Kit.

Likewise, the researchers' attention has been captured by the features of the study of Paderes (2015). This study was conducted to develop and evaluate instructional materials aligned with the discovery approach and to determine the level of appropriateness, acceptability, and usability of the developed instructional materials for science instruction. The Students and Teacher Collaborative Instructional Materials Development Model (STCIMD) was used in the study to develop and evaluate instructional materials for Physics, Chemistry, and Biology. The prepared instructional materials were evaluated by students from the fourth, third, and second years of ASIST Laboratory High School, as well as by the subject teachers. Majority of the instructional materials developed were evaluated by the teachers as Strongly Appropriate (SA), Acceptable (A), and Usable (U). The results showed that the instructional materials piqued their interest and curiosity in discovering the scientific principle underlying the activity. Accordingly, it was determined that these instructional materials aligned to the discovery approach were proven valuable in achieving meaningful learning. Thus, these materials were recommended to be utilized during the lesson presentation to facilitate learning.

The rationale of the current study, which is to develop a material that would result towards achieving meaningful learning, may be comparable to that of the previous study, however, they differ on subject matter focus. Also, it can be noted that Paderes (2015) is attuned towards making the material being developed aligned to discovery approach, a teaching methodology that is believed to be effective in delivering science concepts in the classroom.

Similarly, the study of Guido (2014) entitled "Evaluation of Modular Approach in Materials Science Engineering" showed that the instructional module in materials science and engineering is effective for students' knowledge adaptation and showed suitability to the level of the students and acceptability to the faculty evaluators. The evaluators consist of students and faculty members of the Department of Space and Earth Sciences of the Technological University of the Philippines, Mandaluyong City. It revealed that the evaluators trusted the modules as a valuable tool for the course as it makes students' learning experience well stimulated.

In the study conducted by Marces (2015), he developed and validated an enrichment learning material in Physics for Grade 7 students. He sought the perception of the evaluator respondents about the material involving its organization, comprehensibility, clarity, appropriateness, and usefulness. The developed enrichment material was rated Strongly Agree and no significant difference in the means of the evaluators was noted.

The purpose of the above study which is to determine potential effects of the material being developed and validated on students' performance is quite similar to the ultimate goal of the current study. It aims to create an impact in Science instruction through the material which was developed that is geared towards making the Science classroom more engaging. However, validation is not included in the current study. Evaluators were asked to rate on the material's organization, clarity, comprehensibility, suitability, usefulness, and originality. The material is perceived to have adhered with the indicators for evaluating instructional materials and received a Strong Agreement from the evaluators consisting of science teachers and experts.

This study of Lerion (2018) is associated with the current study as both attempted to develop instructional materials in Physics intended for Junior High School students. However, they differ on the content as the former was focused on materials for enrichment activities while the present study is on regular instruction.

Research Hypothesis

The hypothesis that was pursued in this study was:

1. There is no significant difference in the evaluations of Science experts and Grade 10 Science teachers on the developed learning resource package in Optics for Grade 10 Science.

Definition of Terms Used in the Study

To have a clearer understanding of the study, the following terms used are defined operationally:

Optics. This refers to the area in physical science that deals with the properties and phenomena of both visible and invisible light and vision.

Learning Resource Package. This refers to the developed instructional materials which include the daily lesson log (DLL) exemplar, the PowerPoint presentation and the optics kit which were constructed out of locally available materials.

Daily Lesson Log. This refers to the developed template that teachers could use to log parts of their daily lesson in teaching the concepts in Optics.

PowerPoint Presentation. This refers to the developed individual slides that contain information that could be used in teaching the concepts in Optics.

Optics-kit. This refers to a set of materials designed and constructed that could be used in performing activities that would lead to better understanding of concepts in Optics. It is composed of materials which are available in the locality.

Science Teachers. This refers to the teachers who handle science subjects.

Science Experts. This refers to the Education Program Supervisor, Principals, Assistant Principals, Head Teachers, and Master Teachers whose specialization is science and/or science-related.

Research Design

Methods of Research

The descriptive method of research was employed in this study. Descriptive research does not begin with a fixed hypothesis or research question. Instead, the researchers changed the direction of study according to the data. This procedure is supported by Sevilla (2006:94) by underscoring that descriptive study determines and reports the way things are. It has no control over what is, and it can only measure what already exists. This is also seconded by Travers (2011) who described this method as a way of gathering information about present existing conditions. The principal aim in employing this method is to describe the nature of a situation as particular phenomena. This ushered Gay (2010) to define descriptive research as an activity that involves the collection of data in order to test a hypothesis or to answer questions concerning the status of the subject of the study.

In this study, the developed learning resource package in Optics for Grade 10 Science was described based on the perception of the respondents.

Sources of Data

There were two sources of the needed data in this study. The first source was the Curriculum Guide for Grade 10 Science prescribed by the Department of Education (DepEd) where the lessons on Optics were taken. The second source of pertinent data was the twenty Grade 10 Science Teachers and fifteen Science experts who evaluated the material based on the set standards. They were randomly selected from the list made available by their respective principals and made sure that each high school in the Second District is fairly represented.

Data Gathering Instrument

The data gathering instrument used in this study was the evaluation questionnaire. This was prepared by the researchers and was submitted for validation to five (5) panel experts before it was used for the purpose.

The evaluation questionnaire is distinct for each part. The questionnaire for the Daily Lesson Log (DLL) Exemplar is focused on its content alignment with the Curriculum Guide as prescribed by the Department of Education. Also, the basics in the preparation of DLL from the formulation of objectives down to evaluation were all taken into consideration. In the same manner, the researchers saw to it that the PowerPoint Presentation adheres to the standards in preparing instructional media that is

why the questionnaire for the PowerPoint is focused on the said standards. As for the Tool-Kit, the assessment criteria are centered on its durability, availability, flexibility and provisions to replicate. All three components: DLL, PowerPoint presentation, and tool kit are interconnected and such is evident in the criteria set for each part.

Data Gathering Procedure

The researchers had undergone rigorous preparation of the learning resource package. The DLL Exemplar was prepared first. Topics included were taken from the CG of Grade 10 Science as prescribed by the Department of Education. Several materials were browsed and different experts in the field were consulted to make sure the DLL is content-filled and adhere to the standard. After the DLL had been drafted, the researchers started preparing the PowerPoint presentations for each lesson following the flow as contained in the DLL. The researchers made sure that the PowerPoint presentations contain highlights of the lessons as presented in the DLL. Then lastly, the researchers prepared the optics-kit making sure the materials needed in the activities as provided in the lessons in the DLL were readily available.

Presentation, Analysis and Interpretation of Data

Topics in Optics in Grade 10 Science Based on the Curriculum Guide Prescribed by the Department of Education (DepEd)

The topics in Optics in Grade 10 Science based on the Curriculum Guide as prescribed by the Department of Education include: Mirrors, Plane Mirror, Image Formation in Plane Mirror, Spherical/Curved Mirror, Ray Diagramming Techniques in Curved Mirrors, Mirror Equation, Lenses, Diverging and Converging Lenses, Images with Lenses, Images Formed by Convex Lenses, Images Formed by Concave Lenses, and Ray Diagramming Techniques in Lenses. These were all included in the preparation of the DLL, PowerPoint Presentation, and Optics Kit.

Evaluation of the Developed Learning Resource Package in Optics for Grade 10 Science as Perceived by Science Experts and Grade 10 Science Teachers

Tables 3, 4 and 5 present the evaluation of the Science experts and Grade 10 Science teachers on the developed learning resource package which includes the daily lesson log exemplar, PowerPoint presentation, and optics kit.

Table 3 Evaluation of Science Experts and Grade 10 Science Teachers on the DLL Exemplar

DAILY LESSON LOG (DLL) EXEMPLAR: The DLL exemplar in the learning resource package…	Experts		Grade 10 Science Teachers	
	WM	DV	WM	DV
1. covers topics that are aligned to the k-12 curriculum.	4.87	SA	4.80	SA
2. includes learning objectives that are clear and are adapted from the curriculum guide.	4.87	SA	4.75	SA
3. has content that is current, relevant, and accurate.	4.87	SA	4.70	SA
4. has content that is appropriate to the needs of the target grade level.	4.80	SA	4.60	SA
5. provides content that is logically presented and reflects current and accepted methodologies.	4.80	SA	4.70	SA
6. includes learning activities that cater to the various teaching and learning styles of the teachers and students.	4.80	SA	4.75	SA
7. furnishes learning activities that are presented in a manner which can be effectively understood by the learners.	4.80	SA	4.70	SA
8. provides application that allows learners to connect learned concepts to real-life situations.	4.73	SA	4.65	SA
9. includes learning activities and evaluation that are congruent to the objectives.	4.80	SA	4.65	SA
10. is user-friendly and flexible.	4.80	SA	4.60	SA
Composite Mean	**4.81**	**SA**	**4.69**	**SA**

As shown on Table 3, it can be deduced that the evaluators believed that the DLL Exemplar of the learning resource package followed the criteria set for it with a weighted mean of 4.81 (Strongly Agree) and 4.69 (Strongly Agree) from Science Experts and Grade 10 Science teachers respectively.

The strong agreement from both evaluators means that they believed that the DLL exemplar conform to the standards set for it, therefore, teachers who will be using it will be assured of its reliability and appropriateness for instructional use.

Table 4. Evaluation of Science Experts and Grade 10 Science Teachers on the PowerPoint Presentation

POWERPOINT PRESENTATION: The PowerPoint presentation in the learning resource package…	**Experts**		**Grade 10 Science Teachers**	
	WM	**DV**	**WM**	**DV**
1. highlights key concepts to be learned.	4.87	SA	4.70	SA
2. contains up-to-date and accurate information.	4.80	SA	4.60	SA
3. is distinctly organized to complement the flow of the DLL.	4.80	SA	4.65	SA
4. adheres to the principles of preparing electronic media presentation.	4.73	SA	4.45	A
5. allows students to participate in a meaningful and interactive discussion.	4.73	SA	4.50	SA
6. is flexible so that it can be customized according to the demands of the teachers, students, and situations.	4.67	SA	4.55	SA
7. includes transitions, other slide effects, and format that catch learners' interest.	4.53	SA	4.65	SA
8. is engaging and allows learners' optimum participation.	4.67	SA	4.50	SA
9. provides opportunities for learners to think critically.	4.80	SA	4.50	SA
10. properly acknowledges the sources of information.	4.87	SA	4.65	SA
Composite Mean	**4.75**	**SA**	**4.58**	**SA**

Based on the data provided on the table above, it can be gleaned that the evaluators believed that the PowerPoint Presentation of the learning resource package followed the criteria set for it with a weighted mean of 4.75 (Strongly Agree) and 4.58 (Strongly Agree) from Science experts and Grade 10 Science teachers respectively. However, a difference in the evaluation can be seen in criteria 4 (adheres to the principles of preparing electronic media presentation) with 4.73 (Strongly Agree) for Science experts and 4.45 (Agree) for Grade 10 Science teachers. This may be associated to the fact that the teacher evaluators were fully aware of the principles that must be observed in preparing electronic media presentation.

Meanwhile, the strong agreement from both evaluators could mean that they believed that the PowerPoint presentation adhered to the set standards and therefore considered an effective instructional material that could be used by teachers to enhance the teaching of Optics concept in the classroom.

Table 5. Evaluation of Science Experts and Grade 10 Science Teachers on the Optics-kit

OPTICS-KIT: The optics-kit in the learning resource package…	Experts		Grade 10 Science Teachers	
	WM	DV	WM	DV
1. complements the DLL and the PowerPoint presentation.	4.80	SA	4.70	SA
2. uses simple design that is easy to replicate.	4.87	SA	4.65	SA
3. is attractive, durable, nonhazardous, nontoxic, and safe to use.	4.80	SA	4.65	SA
4. includes basic equipment and tools that are properly labeled.	4.93	SA	4.60	SA
5. provides equipment and tools that are commercially/locally available.	4.73	SA	4.45	A
6. includes set-ups that provide clear and precise results.	4.87	SA	4.65	SA
7. is easy to set-up.	4.87	SA	4.65	SA
8. provides opportunities for learners to further explore on the lesson at hand.	4.73	SA	4.70	SA
9. allows flexibility in its use.	4.80	SA	4.70	SA
10. is portable and easy to store.	4.80	SA	4.65	SA
Composite Mean	**4.82**	**SA**	**4.64**	**SA**

As shown on Table 5, it can be understood that the evaluators believed that the Optics-kit of the learning resource package followed the criteria set for it with a mean of 4.82 (Strongly Agree) and 4.64 (Strongly Agree) from Science Experts and Grade 10 Science teachers respectively. However, a difference in the evaluation can be seen in criteria 5 (provides equipment and tools that are commercially/locally available) with 4.73 (Strongly Agree) for Science experts and 4.45 (Agree) for Grade 10 Science teachers. This may be associated to the fact that the teacher evaluators were more aware of the nature and use of the materials included in the optics kit and their availability in the market.

The strong agreement from both evaluators may mean that they believed that the optics kit conformed to the processes and design set for it and therefore a recommended instructional material that could be used by teachers to enhance the teaching of optics concepts in the classroom.

Comparison in the Evaluation of Science Experts and Grade 10 Science Teachers on the Learning Resource Package in Optics for Grade 10 Science

Table 6 shows the comparison of the evaluation of the Science experts and Grade 10 Science teachers on the learning resource package in Optics for Grade 10 Science.

Table 6. Comparison of the Evaluation of Science Experts and Grade 10 Science Teachers on the Learning Resource Package in Optics for Grade 10 Science

Criteria	Experts		Grade 10 Science Teachers		T	t-crit	Decision	VI
	WM	SD	WM	SD				
Daily Lesson Log DLL Exemplar	4.81	0.04	4.69	0.07	4.943	±2.101	Rejected	Significant
PowerPoint Presentation	4.75	0.10	4.58	0.09	4.019	±2.101	Rejected	Significant
Optics-kit	4.82	0.06	4.64	0.07	5.808	±2.101	Rejected	Significant
Composite	**4.79**	**0.04**	**4.64**	**0.06**	**3.997**	**±2.776**	**Rejected**	**Significant**

Level of significance: 0.0 5df: 18, 4two-tailed test

In terms of the Daily Lesson Log (DLL) Exemplar, it can be drawn from the data presented on Table 6 that the t value of 4.943 is greater than the critical t value of ±2.101. Since the calculated *t* exceeds the critical value (4.943>±2.101), so the means are significantly different and the decision is to reject the null hypothesis.

This means there is sufficient evidence at the 5% level of significance to show that there is significant difference in the evaluation of the two groups of respondents on the DLL Exemplar of the learning resource package in Optics for Grade 10 Science. This implies that the evaluators believed that the DLL is aligned with the K-12 curriculum, it is appropriate to its target learners in terms of content and learning activities including the evaluation tools used, and is flexible. Therefore, the DLL is a promising instructional material that could aid teachers in teaching optics concepts.

For the PowerPoint presentation, it can be gleaned from the data presented on Table 6 that the t value of 4.019 is greater than the critical t value of ±2.101. Since the calculated *t* exceeds the critical value (4.019>±2.101), so the means are significantly different and the decision is to reject the null hypothesis.

This means there is sufficient evidence at the 5% level of significance to show that there is significant difference in the evaluation of the two groups of respondents on the PowerPoint Presentation of the learning resource package in Optics for Grade 10 Science. This implies that the evaluators believed that the PowerPoint presentation adheres to the standards in preparing an instructional media and complements the DLL. Therefore, it could be a good instructional material which teachers may use to enhance the teaching of optics concepts.

As to the optics kit, it can be deduced from the data presented on Table 6 that the t value of 5.808 is greater than the critical t value of ±2.101. Since the calculated *t* exceeds the critical value (5.808>±2.101), so the means are significantly different and the decision is to reject the null hypothesis.

This means there is sufficient evidence at the 5% level of significance to show that there is significant difference in the evaluation of the two groups of respondents on the Optics-kit of the learning resource package in Optics for Grade 10 Science. This implies that the evaluators believed that the optics kit complements the DLL and, is durable, flexible, easy to set up, and is cost-efficient as the materials used are available locally. Therefore, teachers may find it an effective instructional material that may aid them enhance the teaching of optics concepts in the classroom.

After the combined means of each set are being compared, it is concluded that the calculated t *exceeds* the critical t value (3.997>±2.776). This shows the combined means for the parts of the learning resource package of the two groups of respondents are significantly different and the final decision is to reject the null hypothesis. This means there is sufficient evidence at the 5% level of significance to show that there is significant difference in the evaluation of the two groups of respondents on the Learning Resource Package in Optics for Grade 10 Science. This can be traced on the evaluation given for the Powerpoint, criteria 4 with 4.73, Strongly Agree and 4.45, Agree by the Science experts and Grade 10 Science teachers respectively. The same contention can be gleaned in the evaluation given for the Optics-kit, criteria 5 with 4.73, Strongly Agree and 4.45, Agree by the Science experts and Grade 10 Science teachers respectively. This implies that the developed learning resource package in optics could be an effective instructional material which teachers may employ to enhance the teaching of optics in the classroom. The complementing features of the DLL, PowerPoint presentation, and the optics kit is a distinguishing feature of the package that teachers may find very helpful in using it. Furthermore, the teacher could feel more equipped in handling optics classes as the learning resource package is already complete in itself.

Conclusion

From the results of the study, the following are the conclusions:

1. The topics on Optics in the CG prescribed by the Department of Education could serve as a basis for developing a localized

instructional material that would address both teachers' and students' needs.
2. The criteria set for each part of the LRP satisfied the evaluators' belief that the LRP is a promising instructional material for Grade 10 Science

Recommendations

From the findings and conclusions obtained, the following are the recommendations:

1. Other topics in the DepEd Curriculum in Science may be considered in the development of LRP.
2. The developed LRP should be pilot-tested in selected schools in the Second District, SDO-Marikina City to test its effectiveness.
3. Funding from LGU and other institutions, including local funds from schools should be sought by teachers to develop similar instructional material that would enhance the teaching-learning process.
4. Teacher-writers should prepare similar instructional materials that would directly address the needs of the Science classrooms.

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