**Research Article**

# Home-Based Enrichment Activities for Science 9 (Biology): Effects on Students' Academic Performance and Science Engagement

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**ABSTRACT**

This study aimed to develop Home-Based Enrichment Activities specifically designed for Science 9 and assess their impact on academic performance and engagement of Grade 9 students attending public high schools in the Philippines during the first quarter of the school year 2022-2023. This study employed both descriptive and quasi-experimental research methods. The instruments included the validated pre-test and post-test assessments, a survey questionnaire for teachers, and a survey sheet for students. The data was collected from (60) students, (15) high school teachers and (15) master teachers in science in public schools. The data gathered were statistically analyzed using weighted mean, percentage, independent-samples t-Test, paired t-Test, and z-Test. Results showed that the control group exhibited lower mean scores (4.33 and 29.33) in the pretest and posttest compared to the experimental group (13.97 and 38.20), indicating a significant improvement in performance of the students, further affirming the positive impact of the developed Home-based enrichment activities on academic performance. The experimental group also expressed a high level of science learning engagement, demonstrating strong involvement, effort, and preparation in science lessons as manifested by the grand weighted mean of 3.88. Recommendations include incorporate home-based enrichment activities into blended learning modalities, particularly in modular distance learning to help students to learn the lesson and answer their modules on their own and increase students' achievement in Science. Additionally, these supplementary activities can also provide valuable support to students who are at risk of failing a specific subject due to time constraints and challenging learning tasks within their modules.

***Keywords***: *Academic performance, Home-based enrichment activities, Student engagement*

## Introduction

Science has emerged as one of the subjects of significant concern within the secondary curriculum. This is due to the poor academic performance of the students, most especially this time of pandemic. Hence the teachers are trying their best to strengthen their instructions by means of using different approaches that are helpful, such as interactive online games, online collaboration, self-learning modules, weekly home learning plans, harmonized performance task, and written works, etc. But students cannot cope with the requirements due to new set up in education this time of pandemic.

COVID 19, also known as Coronavirus Disease 2019 quickly spreads around the world. COVID-19 has dramatically transformed how we live, work, and study. According to Mentora College of Business and Technology, all aspect of our life is affected by it. Hence, our lives appear to have transformed virtually as a result of this new normal. Sali (2020), stated that, COVID-19 pandemic brings drastic change that challenge many sectors in the society particularly in the field of education. The global health crisis prompted nations to reconsider their educational systems and implement a number of measures to ensure the continuity of learning delivery. Despite the introduction of new pedagogical frameworks and learning modalities, distance education is used as an alternative to traditional face-to-face teaching.

In line with this, Tria (2020) presented that COVID-19 pandemic brought extraordinary challenges and has affected the educational sectors. In order to ensure the continuity of quality education during lockdowns and community quarantines, it is essential to embrace the concept of the "new normal." Giving priority to planning and implementing educational policies aligned with the new normal is crucial to sustain the delivery of learning despite the risks posed by the pandemic. Teachers must be aware of their role since they bear a higher responsibility for instilling positive attitudes in the face of pandemic. School leaders are working hard to prepare teachers with the most important skills, new methodology, new learning and teaching resources, and various modalities to transmit learnings in various ways and use to meet this problem.

Hendricks (2018) stated that curricular activities inside classroom environment offers students the opportunity to have face to face interaction with their peers and teachers and this allows them to engage with the discussion, to learn easily and directly clarify the things that make the students confused about the lesson.

Development of Home-based enrichment activities is one of the teaching strategies that can aid in solving problems in Science teaching this time of pandemic, because this will provide opportunity to the students in modular distance learning to do hands on activities. This will allow the students to engage with the lesson to achieve the intended learning outcome by doing actual activities on their own. On the other hand, this can aid to retain the ideas they have learned from the lesson with less supervision, since distance learning was mandated by national and local authorities to prevent the spreading of the respiratory infection caused by Covid 19.

With the use of Home-based enrichment activities in line with Most Essential Learning Competencies (MELCs) provided by the Department of Education, it aims to enhance students' academic performance and promote learning engagement to make learning more meaningful while students at their home.

By utilizing Home-based enrichment activities aligned with the Most Essential Learning Competencies (MELCs) outlined by the Department of Education, the primary goal is to improve students' academic performance and foster active learning engagement, making the educational experience more meaningful for students within the comfort of their homes. Home-based enrichment activities provide learning tasks which help students to become more engaged in their lesson and retain more information.

Burke (2020), stated that, home-based activities allow students to explore their own level of understanding, students can explore activities at their own pace that facilitate learning in many ways. According to Taylor (2019), enrichment activities at home encourage learners to take a more expansive or in depth look at a

concept or topics, it enhances students' perspective, exploration, intrinsic curiosity that will lead to lifelong learning. Conforming to Ryan (2020), Home -based enrichment activities are set experience where learners can extend their learning to improve or enhance their skills, knowledge and well-being. Home-based enrichment activities can provide entertainment and enjoyment to the learners while sharpening their skills. These help students to fuse with the subject to a more meaningful or rewarding way, these also encourage further exploration, promote intrinsic curiosity that will lead to lifelong learning.

Similarly, according to Wells (2021), there are well-established correlations between enrichment activities and academic achievement. Engaging in enrichment activities fosters the development of critical thinking and problem-solving skills, enhances students' ability to focus, and makes learning more meaningful, valuable, and satisfying. These activities are designed to be enjoyable, thus increasing student engagement and facilitating better retention of information and facts related to the lesson.

This study developed and validated the home-based enrichment activities in Science 9 to provide engagement in Science to enhance learning amidst pandemic. By utilizing the developed home-based enrichment activities aligned with the Most Essential Learning Competencies (MELCs) set by the Department of Education, the intention is to assist students in monitoring their performance and provide guidance to enhance their academic achievements while learning from home, thus addressing the challenges associated with modular distance learning.

Thus, this study sought determine the effects of Home-based enrichment activities on the academic performance and science engagement of Grade 9 public school students Grade 9 Science students in the Philippines during the first quarter of school year 2022-2023.

### Purpose of the Study

The purpose of this study was to develop Home-Based Enrichment Activities for Science 9 and determine its impact on the academic performance and Science engagement of Grade 9 public school students in the Philippines during first quarter for the school year 2022-2023

Specifically, it sought answers to the following questions:

1. What topics in Grade 9 Science were developed into Home-based enrichment activities based on the Most Essential Learning Competencies (MELCs)?
2. What was the evaluation of science teachers and experts on the developed home-based enrichment activities in terms of criteria?
   2.1 Content;
   2.2 Format;
   2.3 Presentation and Organization; and
   2.4. Accuracy and up-to datedness of information.
3. Was there a significant difference in the evaluation of the two groups of respondents on the developed home-based enrichment activities based on the aforementioned criteria?
4. What was the performance of the students in the pre-test and post-test in learning Science 9 using:
   4.1 DepEd Modules; and
   4.2 DepEd Modules with home-based enrichment activities?
5. Was there a significant difference in the pre-test and post-test mean scores of students who used only DepEd modules and those who used DepEd modules with Home-based enrichment materials?
6. Was there a significant difference in the post-test mean score of the two groups of students?
7. What was the level of science learning engagement of the students who used the DepEd modules with home-based enrichment activities as regards as perceived by themselves?
   7.1 Engagement on Science lessons and task
   7.2 Science Learning Involvement
   7.3 Science Effort and Preparation?
8. What were the comments and suggestions of the teachers and students in using home-based enrichment activities?

## Methods

This study utilized the descriptive and quasi experimental method of research. The descriptive method provided a literal description of a situation or event. It is the accumulation of data that is solely descriptive but may also aim for more powerful purpose like to seek or explain relationship, test hypothesis, make prediction or get meaning and implications (Alolor, 2017). It is useful for gathering information about current existing condition (Atmowardoyo, 2018). This research method involves manipulating one or more independent variables and measuring their impact on one or more dependent variables. The study used this method to describe and validate the effectiveness of home-based enrichment activities specifically designed for Grade 9 students.

According to Thomas (2022), quasi experimental design aims to establish cause and effect relationship of an independent and dependent variable. Quasi-experimental aimed to assess the impact of a particular intervention or enhancement program by comparing a control group with an experimental group. In the present study, this research method was employed to evaluate the effects of implementing the developed Home-based enrichment activities for science 9 and its influence on academic performance and science engagement, in comparison to students who utilized regular modules provided by the school.

The instruments included the validated pre-test and post-test assessments, a questionnaire, a survey sheet for teachers and experts adopted from the Department of Education's evaluation tool for printed materials, and a survey sheet for students adapted from the Students Science Engagement Scale (SSES) developed by Baranquia (2019). The data was collected from (60) students, (15) high school teachers and (15) master teachers in science in public schools.

*Table 1. Distribution of Grade 9 Student-Respondents*

| Respondents | Frequency |
|---|---|
| Experimental Group | 30 |
| Controlled Group | 30 |
| Total | 60 |

Table 1 shows the distribution of Grade 9 student respondents in a public high school in the Philippines. The selection of participants was based on the results of their diagnostic tests. Students with equal averages were matched in control and experimental group. The control group utilized conventional modules, whereas the experimental group utilized the developed home-based enrichment activities.

*Table 2. Distribution of Teacher-Respondents*

| Respondents | Frequency |
|---|---|
| Science Teachers | 15 |
| Master Teachers (Experts) | 15 |
| Total | 30 |

Table 2 shows the distribution of evaluators who assessed the developed Home-based enrichment activities for Science 9. The evaluation was conducted by both teachers and experts, who provided their assessments based on several criteria, including content, format, presentation and organization, and accuracy and up-to-datedness of information.

The data gathered were statistically analyzed using weighted mean, percentage, independent-samples t-Test, paired t-Test, and z-Test.

*Table 3. Distribution of Grade 9 Student-Respondents*

| Scale | Range | Verbal Interpretation |
|---|---|---|
| 4 | 3.50-4.00 | Strongly Agree (SA) |
| 3 | 2.50-3.49 | Agree   (A) |
| 2 | 1.50-2.49 | Disagree (D) |
| 1 | 1.00-1.49 | Strongly disagree (SD) |

*Table 4. Score and interpretation for the Performance of the Students Respondents in the Pretest and Posttest*

| Score | Verbal Interpretation |
|---|---|
| 49 – 55 | Highly Proficient |
| 42 – 48 | Proficient |
| 28 – 41 | Nearly Proficient |
| 14 – 27 | Low Proficient |
| 00 – 13 | Not Proficient |

Table 3 shows a four-point Likert's scale used indicate the degree or level of agreement for the evaluation of the teacher and expert respondents in each item. Each statement in the criteria was rated using 1 to 4 rating scales with the corresponding verbal interpretations: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

Table 4 displays the scores the score and descriptions of the performance of the students in Pretest and Posttest.

## Results and Discussion
### A. Topics in Grade 9 Science for the Development of Home-based Enrichment Activities based on Most Essential Learning Competencies (MELCs)

*Table 5. Topics Covered in the First Quarter of Science 9 Based on the Most Essential Competencies (MELCS)*

| No. | Topics |
|---|---|
| 1 | Respiratory and Circulatory System |
| 2 | Non-Mendelian Inheritance |
| 3 | Species Extinction |
| 4 | Photosynthesis |
| 5 | Cellular Respiration |

Table 5 shows the sequential arrangement and list of topics for Science 9 during the First Quarter Period, aligned with the Most Essential Learning Competencies (MELCs) provided by the Department of Education (DepEd) for the development of Home-based enrichment activities in Science 9. Each topic is addressed within every activity incorporated in the developed Home-based enrichment activities during the First Quarter period of the school year 2022-2023.

**B. Evaluation of Science Teachers and Experts on the Developed Home-Based Enrichment Activities for Science 9**

*Table 6. Respondents' Evaluations on the Developed Home-Based Enrichment Activities in Science 9 as Regards Content*

| Indicators | Respondents | | | |
|---|---|---|---|---|
| | Teachers | | Master Teachers | |
| | WM | VI | WM | VI |
| 1. Content is suitable to the student's level of development and has the potential to arouse the interest of the students. | 3.80 | SA | 3.67 | SA |
| 2. Material contributes to the achievement of specific objectives of the subject area. | 3.73 | SA | 3.60 | SA |
| 3. Material enhances the development of desirable traits such as higher cognitive skills, critical thinking skills, creativity, learning by doing inquiry, problem-solving, etc. | 3.73 | SA | 3.67 | SA |
| 4. Materials are free of ideological, cultural, religious, racial, and gender biases and prejudices. | 3.67 | SA | 3.67 | SA |
| 5. Adequate warning and cautionary notes are provided in the activities where safety and health are of concern. | 3.47 | A | 3.53 | SA |
| Overall Weighted Mean | 3.68 | SA | 3.63 | SA |
| Standard Deviation | 0.39 | | 0.44 | |

*Note: WM – Weighted Mean      VI – Verbal Interpretation      SA – Strongly Agree      A – Agree*
*Strongly Agree- (3.50-4.00)      Agree-  (2.50-3.49)*
*Disagree-(1.50-2.49)      Strongly Disagree-(1.00-1.49)*

Table 6 shows that both Science teachers and expert respondents **Strongly Agreed** on the content of the developed Home-based enrichment activities for Science 9 during the first quarter period. This is supported by the overall weighted means of 3.68 and 3.63, as well as the standard deviations of 0.39 and 0.44, respectively. These findings indicate that the content of the Home-based enrichment activities is deemed appropriate by both teachers and experts, and it aligns well with the specific objectives of the subject matter.

Content, as described by Kennett (2019), is a set of instructions that plays a vital role in the educative process. It serves as a tool for students to comprehend and master skills while also serving as a means of communication between teachers and students. When designing learning activities, it is crucial that the content and descriptions of the learning materials are clear and suitable to the students' level of understanding (Nouri et al., 2021). This will allow the learners to connect to the lesson easily and at the same time to fulfil intended learning outputs on time.

*Table 7. Respondents' Evaluations on the Developed Home-Based Enrichment Activities in Science 9 as Regards Format*

| Indicators | Respondents | | | |
|---|---|---|---|---|
| | Teachers | | Master Teachers | |
| | WM | VI | WM | VI |
| 1. Size and spaces of letters are appropriate to the intended users. | 3.73 | SA | 3.67 | SA |
| 2. Printing is good quality. | 3.80 | SA | 3.73 | SA |
| 3. Illustrations are easily recognizable, properly labeled, and supplement the text. | 3.60 | SA | 3.53 | SA |

| Indicators | Respondents | | | |
| --- | --- | --- | --- | --- |
| | Teachers | | Master Teachers | |
| | WM | VI | WM | VI |
| 4. Layout is simple and pleasing. | 3.73 | SA | 3.60 | SA |
| 5. Harmonious blending of illustrations and text. | 3.67 | SA | 3.73 | SA |
| Overall Weighted Mean | 3.71 | SA | 3.65 | SA |
| Standard Deviation | 0.42 | | 0.31 | |

*Note: WM – Weighted Mean    VI – Verbal Interpretation    SA – Strongly Agree    A – Agree*
*Strongly Agree- (3.50-4.00)    Agree- (2.50-3.49)*
*Disagree-(1.50-2.49)    Strongly Disagree-(1.00-1.49)*

Table 7 shows that both Science teachers and expert respondents **Strongly Agreed** on the format of the developed Home-based enrichment activities for Science 9 as shown in the overall weighted mean of 3.71 and 3.65, and standard deviations of 0.42 and 0.31, respectively. This implies that the format of the developed Home-based enrichment activities for Science 9, as assessed by Science Teachers and Experts, is properly formatted. Size, spacing, illustrations, and layout are properly put to allow students to self-learn the lessons.

Format is one of the essential elements in making learning materials. Proper formatting can make the instructional materials concise, organized, can simply provide valuable information and can effortlessly convey the ideas from the teachers to the students. (Fudge, 2019)

*Table 8.  Respondents' Evaluations on the Developed Home-Based Enrichment Activities in Science 9 as Regards Presentation and Organization*

| Indicators | Respondents | | | |
| --- | --- | --- | --- | --- |
| | Teachers | | Master Teachers | |
| | WM | VI | WM | VI |
| 1. Presentation is engaging, interesting, and understandable | 3.73 | SA | 3.67 | SA |
| 2. There is a logical and smooth flow of ideas. | 3.60 | SA | 3.53 | SA |
| 3. Vocabulary level is adapted to the student's likely experience and level of understanding. | 3.67 | SA | 3.60 | SA |
| 4. Sentences are suitable to the comprehension level of the students. | 3.60 | SA | 3.53 | SA |
| 5. Sentences and paragraph structure are varied and interesting to the students. | 3.67 | SA | 3.60 | SA |
| Overall Weighted Mean | 3.65 | SA | 3.59 | SA |
| Standard Deviation | 0.42 | | 0.44 | |

*Note: WM – Weighted Mean    VI – Verbal Interpretation    SA – Strongly Agree    A – Agree*
*Strongly Agree- (3.50-4.00)    Agree- (2.50-3.49)*
*Disagree-(1.50-2.49)    Strongly Disagree-(1.00-1.49)*

Table 8 shows that both Science teachers and expert respondents **Strongly Agreed** on the presentation and organization of the developed Home-based enrichment activities for Science 9 as shown by the overall weighted mean of 3.65 and 3.59, and standard deviations of 0.42 and 0.44, respectively. This signifies that the developed Home-based enrichment activities for Science 9, as assessed by Science Teachers and Experts, are well-organized and properly presented. The activities demonstrate a seamless flow of ideas, allowing students to actively participate and fostering their motivation to engage in independent learning.

A well-organized presentation of learning activities helps the teacher and students

achieve the intended objectives after a specific learning task in the lesson, it helps impart ideas, and establish teacher's expertise and authority on the subject to deliver the learning in more meaningful and rewarding way. Organized and well-presented activities help to engage the learners, makes the acquisition of the ideas simple, straightforward, and logical manner. Presenting and organizing properly the learning activities get students' attention to keep them interested and ensure they can gain valuable information needed to promote lifelong learning. (Lares, 2020)

*Table 9. Respondents' Evaluations on the Developed Home-Based Enrichment Activities in Science 9 as Regards Accuracy and Up-to-Datedness of the Information*

| Indicators | Respondents | | | |
| --- | --- | --- | --- | --- |
| | Teachers | | Master Teachers | |
| | WM | VI | WM | VI |
| 1. Activity sheet has no conceptual errors. | 3.53 | SA | 3.60 | SA |
| 2. Activity sheet has no factual errors. | 3.67 | SA | 3.53 | SA |
| 3. Activity sheet has no grammatical errors. | 3.60 | SA | 3.60 | SA |
| 4. Activity sheet has no obsolete information. | 3.60 | SA | 3.53 | SA |
| 5. Activity sheet has no typographical and other minor errors (e.g., inappropriate unclear illustrations, missing labels, and wring captions. | 3.53 | SA | 3.53 | SA |
| Overall Weighted Mean | 3.59 | SA | 3.56 | SA |
| Standard Deviation | 0.43 | | 0.29 | |

*Note: WM – Weighted Mean    VI – Verbal Interpretation    SA – Strongly Agree    A – Agree*
*Strongly Agree- (3.50-4.00)    Agree-  (2.50-3.49)*
*Disagree-(1.50-2.49)    Strongly Disagree-(1.00-1.49)*

Table 9 shows that both Science teachers and expert respondents **Strongly Agreed** on the accuracy and up-to-datedness of the information of the developed Home-based enrichment activities for Science 9 as shown by the overall weighted mean of 3.59 and 3.56, and standard deviations of 0.43 and 0.29, respectively. This implies that the developed Home-based enrichment activities are accurate and updated as evaluated by the two groups of respondents and have no conceptual and factual errors for fast and better understanding of the learners.

Regoniel (2021) emphasizes that data accuracy and reliability are crucial prerequisites for achieving excellence. Inaccurate and unreliable data can result in misleading or incorrect conclusions. The accuracy of data holds utmost importance, particularly in instructional materials. Reliable and appropriate information contributes to improved decision-making and enhances the understanding of various concepts within the subject matter.

*Table 10. Summary of Respondents' Evaluations on the Developed Home-Based Enrichment Activities in Science 9*

| Criteria | Respondents | | | |
| --- | --- | --- | --- | --- |
| | Teachers | | Master Teachers | |
| | OWM | VI | OVM | VI |
| Content | 3.68 | SA | 3.63 | SA |
| Format | 3.71 | SA | 3.65 | SA |
| Presentation and Organization | 3.65 | SA | 3.59 | SA |
| Accuracy and up-to-datedness of the information | 3.59 | SA | 3.56 | SA |
| Grand Weighted Mean | 3.66 | SA | 3.61 | SA |

*Note:* OWM – Overall Weighted Mean    VI – Verbal Interpretation
       SA – Strongly Agree               A – Agree
       Strongly Agree-(3.50-4.00)      Agree-(2.50-3.49)
       Strongly Disagree-(1.00-1.49)   Disagree-(1.50-2.49)

Table 10 shows that the two groups of respondents had precise same evaluations of the Home-based enrichment activities as teaching materials in terms of Content, Format, Presentation and Organization, and Accuracy and Up- to datedness of the information as revealed by the grand weighted mean of 3.66 and 3.61 respectively. Table 10 evidently shows that all its criteria and indicators are **Strongly Agreed**.

## C. Significant Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities

*Table 11. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities as to Content*

| Respondents | n | OWM | S | Computed t Value | Critical t value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Teachers | 15 | 3.68 | 0.39 | 0.35 | 2.05 | Do not Reject the $H_0$ | Not Significant |
| Master Teachers | 15 | 3.63 | 0.44 | | | | |

*Note: n – Sample Size          s – Standard Deviation        $H_0$ – Null Hypothesis*
*      Level of Significance, α = 5%   Degrees of Freedom, df = 28*

Based on Table 11, the critical t value is determined to be 2.05, while the computed t value is calculated as 0.35 at a significance level of 5% and 28 degrees of freedom. Since the computed t value is lower than the critical t value, the statistical decision is to not reject the null hypothesis. Hence, there is no significant difference between the evaluations of the two groups of respondents on the developed home-based enrichment activities in Science 9 in terms of content.

This implies that the Content aspect in the developed Home-based enrichment activities is suitable for the learners and meet the challenging expectations of the K to 12 curriculum for Science 9 students. The learning objectives and the topic are aligned to the Most Essential Learning Competencies that are appropriate to the needs of the learners.

*Table 12. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities as to Format*

| Respondents | n | OWM | S | Computed t Value | Critical t value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Teachers | 15 | 3.71 | 0.42 | 0.40 | 2.05 | Do not Reject the $H_0$ | Not Significant |
| Master Teachers | 15 | 3.65 | 0.31 | | | | |

*Note: n – Sample Size          s – Standard Deviation        $H_0$ – Null Hypothesis*
*      Level of Significance, α = 5%   Degrees of Freedom, df = 28*

Based on Table 12, the critical t value is determined to be 2.05, while the computed t value is calculated as 0.40 at a significance level of 5% and 28 degrees of freedom. Since the computed t value is lower than the critical t value, the statistical decision is to not reject the null hypothesis. Hence, there is no significant difference between the evaluations of the two groups of respondents on the developed home-based enrichment activities in Science 9 in terms of format.

This means that the two group of respondents have the same beliefs that the format of the developed Home-Based Enrichment Activities are well-labelled, simple, pleasing and appropriate to the target group.

*Table 13. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities as to Presentation and Organization*

| Respondents | n | OWM | S | Computed t Value | Critical t value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Teachers | 15 | 3.65 | 0.42 | 0.42 | 2.05 | Do not Reject the $H_0$ | Not Significant |
| Master Teachers | 15 | 3.59 | 0.44 | | | | |

*Note: n – Sample Size  s – Standard Deviation  $H_0$ – Null Hypothesis*
*Level of Significance, α = 5%  Degrees of Freedom, df = 28*

Table 13 shows that the critical t value is determined to be 2.05, while the computed t value is calculated as 0.42 at a significance level of 5% and 28 degrees of freedom. Since the computed t value is lower than the critical t value, the statistical decision is to not reject the null hypothesis. Hence, there is no significant difference between the evaluations of the two groups of respondents on the developed home-based enrichment activities in Science 9 in terms of presentation and organization.

This implies that the two groups of respondents have the same idea as to the presentation and organization of the developed Home-Based Enrichment Activities as far as sentence structuring, flow of the idea and suitability to the target group.

*Table 14. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities as to Accuracy and Up-to-Datedness of the Information*

| Respondents | n | OWM | S | Computed t Value | Critical t value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Teachers | 15 | 3.59 | 0.43 | 0.20 | 2.05 | Do not Reject the $H_0$ | Not Significant |
| Master Teachers | 15 | 3.56 | 0.29 | | | | |

*Note: n – Sample Size  s – Standard Deviation  $H_0$ – Null Hypothesis*
*Level of Significance, α = 5%  Degrees of Freedom, df = 28*

In Table 14, the computed t value of 0.20 is lower than the critical t value of 2.05. At the 5% level of significance, the statistical decision is to not reject the null hypothesis. Therefore, there is no significant difference between the evaluations of the two groups of respondents on the developed home-based enrichment activities in Science 9 in terms of accuracy and up-to-datedness of the information. This means that the two group of respondents have the same viewpoint that the developed Home-Based Enrichment Activities are accurate and up to data.

*Table 15. Summary of Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed Home-Based Enrichment Activities*

| | Teachers | | Master Teachers | | Computed t Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| | OWM | S | OWM | S | | | |
| a. Content | 3.68 | 0.39 | 3.63 | 0.44 | 0.35 | Do not Reject the $H_0$ | Not Significant |
| b. Format | 3.71 | 0.42 | 3.65 | 0.31 | 0.40 | Do not Reject the $H_0$ | Not Significant |
| c. Presentation and Organization | 3.65 | 0.42 | 3.59 | 0.44 | 0.42 | Do not Reject the $H_0$ | Not Significant |

| | Teachers | | Master Teachers | | Computed t Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| | OWM | S | OWM | S | | | |
| d. Accuracy and up-to-datedness of the information | 3.59 | 0.43 | 3.56 | 0.29 | 0.20 | Do not Reject the $H_0$ | Not Significant |

*Note: ⍺ = 5%          df = 28          Critical t Value = 2.05*

Table 15 shows the evaluation of Science teachers and expert respondents regarding the developed home-based enrichment activities in Science 9, specifically focusing on content, format, presentation and organization, as well as accuracy and up-to-datedness of information. The computed t values for each of these aspects are all lower than the critical t value, indicating that no significant difference exists between the evaluations of the two groups. This leads to the conclusion that the respondents' evaluations align with each other. It can also be inferred that the Home-Based Enrichment Activities are well-prepared and suitable for students to use in their Biology learning.

### D. Performance of the Students in Pre-test and Post -test in Learning Science 9 Using (a) DepEd modules, and (b) DepEd modules and with Home Based Enrichment Activities

*Table 16. Performance of the Students in the Pre-test and Post-test in Learning Science 9 Using DepEd Modules*

| | Mean Score | SD | Mean Difference |
|---|---|---|---|
| Pretest | 14.33 | 4.47 | 15.0 |
| Posttest | 29.33 | 10.49 | |

Table 16 presents the performance of students in learning Science 9 using only DepEd modules, through the pre-test and post-test scores. The mean score for the pre-test is 14.33, while for the post-test it is 29.33. The corresponding standard deviations are 4.47 and 10.49, respectively, and the mean difference between the two tests is 15.0.

This means the students' performance has increased after learning using the modules prepared by DepEd.

*Table 17. The Percentage of Performance of the Students in the Pre-test and Post-test in Learning Science 9 with Home-Based Enrichment Activities*

| | Mean Score | SD | Mean Difference |
|---|---|---|---|
| Pretest | 13.97 | 5.52 | 24.23 |
| Posttest | 38.20 | 8.51 | |

Table 17 presents the performance of students in learning Science 9 using DepEd modules with Home-based enrichment activities through the pre-test and post-test scores. The mean score for the pre-test is 13.97, while for the post-test it is 38.28. The corresponding standard deviations are 3.52 and 8:51, respectively, and the mean difference between the two tests is 24.23.

This means the developed Home-based enrichment activities for experimental groups improved the performance of Grade 9 learners in Science.

### E. Significant Difference in the Pre-test and Post-test Mean Scores of the Two Groups of Students who Used the Aforesaid Instructional Materials

*Table 18. Test of Significant Difference Between the Pretest and Posttest Mean Scores of the Control Group*

| Tests | Mean Score | S | Computed *t* Value | Critical *t* Value | Decision | Interpretation |
|---|---|---|---|---|---|---|
| Pretest | 14.33 | 4.47 | 12.98 | 2.05 | Reject the $H_0$ | Significant |
| Posttest | 29.33 | 10.49 | | | | |

*Note: α = 5%            df = 29*

At 5% level of significance, the critical t value with 29 degrees of freedom is 2.05, and the computed t value is 12.98 as reflected in Table 18. As the computed t value is above the critical t value, then the statistical decision is to reject the null hypothesis. Hence, there is enough evidence to support that there is a significant difference between the pre-test and post-test mean scores of the control group in Science 9.

This concludes that the mean score of the posttest is higher than the mean score of the pretest, so there is a slight improvement of the students' performance of the control group using conventional approach and with the use of DepEd Module in teaching Science 9.

*Table 19. Test of Significant Difference Between the Pretest and Posttest Mean Scores of the Control Group*

| Tests | Mean Score | S | Computed *t* Value | Critical *t* Value | Decision | Interpretation |
|---|---|---|---|---|---|---|
| Pretest | 13.97 | 3.52 | 24.91 | 2.05 | Reject the $H_0$ | Significant |
| Posttest | 38.20 | 8.51 | | | | |

*Note: α = 5%            df = 29*

It is apparent in Table 19 that the computed t value of 24.91 is more than the critical t value 2.05. At 5% significance level, the statistical decision is to reject the null hypothesis. Therefore, there is adequate evidence to show that there is a significant difference between the pretest and posttest mean scores of the experimental group in Science 9.

As shown on table 19, the mean score of the posttest of the experimental group really steps up than the mean score of the pretest, thus there is really an improvement of students' performance of the experimental group using Home-based enrichment activities. Thus, the developed Home-Based Enrichment Activities help a lot in the students' understanding of concepts in Biology.

### F. Significant Difference in the Post-test Mean Score of the Two Groups of Students.

*Table 20. Test of Significant Difference Between the Mean Scores of the Control and Experimental Groups in the Post-test*

| Groups | Mean Score | S | Computed *z* Value | Critical *z* Value (α=5%) | Decision | Interpretation |
|---|---|---|---|---|---|---|
| Control | 29.33 | 10.49 | 3.60 | 1.96 | Reject the $H_0$ | Significant |
| Experimental | 38.20 | 8.51 | | | | |

Table 20 displayed that the computed z-value of 3.60 is higher than the critical z value 1.96. This implies that the null hypothesis should be rejected at a 5% level of significance.

Therefore, there is sufficient evidence to support that there is a significant difference between the posttest mean scores of the control and experimental groups.

### G. Level of Science Engagement of the Students Who Used the DepEd Modules with Home-Based Enrichment Activities as Regards Engagement on Science lessons and Task, Science Learning Involvement, and Science Effort and Preparation.

*Table 21. Level of Science Learning Engagement of The Students Who Used the DepEd Modules with Home-Based Enrichment Activities as Regards Engagement on Science Lessons and Task*

| Engagement in Science Lessons and Tasks | WM | Interpretation |
|---|---|---|
| 1. I am inspired and prepared to do Science activities every day. | 3.90 | Very High Level |
| 2. I am inspired to learn new things in science. | 3.83 | Very High Level |
| 3. I feel encouraged and interested to work on something in science. | 3.93 | Very High Level |
| 4. My Science lessons and performance tasks are interesting and meaningful. | 3.90 | Very High Level |
| 5. My Science lessons and performance tasks are important and relevant to my life. | 3.76 | Very High Level |
| 6. My Science lessons and performance task are realistic and contextualized. | 3.90 | Very High Level |
| 7. My Science lessons and performance tasks stimulate my curiosity. | 3.83 | Very High Level |
| Overall Weighted Mean | 3.86 | Very High Level |

Table 21 show that all respondents in experimental group response **Very High Level** in all indicators as regards to Engagement in Science Lessons and Tasks with a overall weighted mean of 3.86. This indicates the student's engagement in Science lesson and task improved using DepEd Module and with the use of the developed Home-based enrichment activities. This is an evidence that the developed home-based enrichment activities promote science engagement. Furthermore, this also promotes students' participation. This helps students to actively participate in science lessons and to freely partake in science learning tasks resulting to academic achievement.

*Table 22. Level of Science Learning Engagement of The Students Who Used the DepEd Modules with Home-Based Enrichment Activities as Regards Science Learning Involvement*

| Science Learning Involvement | WM | Interpretation |
|---|---|---|
| 1. I am having fun during collaborative learning activities in science. | 3.92 | Very High Level |
| 2. I want to ask my Science teacher or classmates personally or through social media if I have trouble in understanding a lesson. | 3.90 | Very High Level |
| 3. I want to investigate and understand the societal and environmental impacts and implications of science and technology. | 3.93 | Very High Level |
| 4. I participate and interact during small group discussions about science subjects. | 4.00 | Very High Level |
| 5. I appreciate the nature of the scientific method or process. | 3.93 | Very High Level |
| 6. I consult and share my views and knowledge with my classmates and science teacher. | 3.90 | Very High Level |
| 7. I use my creativity and inventiveness in doing my science work | 3.90 | Very High Level |
| **Overall Weighted Mean** | **3.93** | **Very High Level** |

Table 22 presents the perception of the experimental group on the developed Home-based enrichment activities for science 9 in terms of science learning involvement. All respondents in the experimental group response **Very High Level** in all the indicators with an overall weighted mean of 3.93. This is evident that the Level of Science Learning Involvement of the students really improved using DepEd Module and with the use of the developed Home-based enrichment activities. This means that the students are more engage in learning

because they can interact will small group. They appreciate nature or scientific process and are able to make inventions while doing Science activity. Moreover, this is an indicator that using home-based enrichment activities really help the students to enjoy and connect with the lesson, resulting to active involvement in learning science while at home.

*Table 23. Level of Science Learning Engagement of The Students Who Used the DepEd Modules with Home-Based Enrichment Activities as Regards Science Effort and Preparation*

| Science Effort and Preparations | WM | Interpretation |
|---|---|---|
| 1. I do and finish my science task on time | 3.80 | Very High Level |
| 2. I read and review my class notes, hand-outs, and Self learning module between classes to make sure that I learn from these Science learning materials. | 3.86 | Very High Level |
| 3. I prepare thoroughly before the summative test or exam in science. | 3.76 | Very High Level |
| 4. I give maximum effort to my science class. | 3.86 | Very High Level |
| 5. I always pay attention to my teacher and classmates who communicate during written works and activities in science. | 3.83 | Very High Level |
| 6. I feel supported by my classmates and science teacher. | 3.90 | Very High Level |
| 7. I follow the instructions closely in doing my science work. | 4.00 | Very High Level |
| **Weighted Mean** | **3.86** | **Strongly Agree** |

As specified in Table 23, the perceptions of the experimental group on the developed Home-based enrichment activities for Science 9 in terms of Science Effort and Preparation, shows that, all the respondents in the experimental group's response is Very High Level in all the indicators with an overall weighted mean of 3.86. This implies that their Level of Science Effort and Preparations become better using DepEd Module and with the use of the developed Home-based enrichment activities.

*Table 24. Summary of the Perceptions of the Students on their level of Science Learning Engagement Using the Home-Based Enrichment Activities*

| Dimension | OWM | Verbal Interpretation |
|---|---|---|
| 1.Engagement on Science Lesson and Task | 3.66 | VHL |
| 2.Science Learning Involvement | 3.93 | VHL |
| 3.Science Effort and Preparation | 3.86 | VHL |
| Grand Weighted Mean | 3.88 | VHL |

*Note: VHL -Very High Level*

Table 24 summarizes the perception of the students on their level of Science Learning Engagement was at a very high level as indicated by the grand weighted mean of 3.88. This mean that students were more involved, interested and committed in learning Science when they used the Home-based enrichments activities.

This implies that the developed Home-based enrichment activities were very useful in students learning.

***F. Comments and Suggestions of the Teachers and Students in Using the Home-Based Enrichment Activities in Science 9***

The following are comments and suggestions provided by Science teachers, experts, and students:

Teachers and Experts Comments

(a) The Home-based enrichment activities for Science 9 is very timely and it is really a big help to the students in modular classes. The lessons were very clear and neatly presented. (b) Every activity is meaningful and useful because students enable to engage and develop their

skills and understanding. (c) This home-based activities was a great help to support the students especially in the new normal wherein physical contact to our learners is highly discourage due to the risk of COVID-19. Keep it up! (d) The module was clear and concise, the pictures/ images fit the purpose of the lesson. (e) The structure of the activities was generally organized. Very interesting and interactive most especially the decoding part. (f) All grade level must have a ready-made home-based activity like this. (g) The material is composed of different parts which provides an aid to limited face to face classes. (h) The parts of the home-based activities are well arranged; (I) All parts of the Home-based activities are interactive (j) The developed home-based activities are suitable to the current situation. It's really a support the Grade 9 Science students to learn the lesson.

*Teachers and Experts Suggestions*

(a) Make sure students will be able to finish the learning tasks while at home. (b) Add trivia or some key insights. (c) Give additional activities since most of the learning tasks are interesting. (d) Provide digital copy of the Home-based enrichment activities with QR code so that students can easily have a copy by simply scanning the code.

*Students' Comments*

(a) Very interesting, it helps the students in answering the Self Learning Module (SLM). (b) Activities in the home-based enrichment activities provide learning tasks that help the learners to easily understand the different concepts in a particular lesson. (c) Provide another home-based enrichment activities that can help the students in answering the SLM in second, third and fourth quarter. (d) Attractive diagrams and illustrations, activities are well presented. (e) The activities boost the interests of the students to learn the topics.

*Students' Suggestions*

(a) Make an online version of this Home-based enrichment activities. (b) Give more games-based activities because it's fun. (c) Provide home-based activities for online classes (d) Give more decoding activities.

## Conclusion and Recommendation

The study revealed several significant findings. The topics covered during the first quarter period aligned with the Most Essential Learning Competencies (MELCs) included Respiratory and Circulatory System, Non-Mendelian Inheritance, Species Extinction, Photosynthesis, and Cellular Respiration. Both teachers and experts strongly agreed with the content, format, presentation, organization, accuracy, and up to datedness of the Home-based enrichment activities, with grand means of 3.66 and 3.61 respectively. There was no significant difference found between the evaluations of the two groups of respondents regarding the developed Home-based enrichment activities for Science 9.

Additionally, the control group exhibited lower mean scores (4.33 and 29.33) in the pretest and posttest compared to the experimental group (13.97 and 38.20), indicating a significant improvement in performance of the students, further affirming the positive impact of the developed Home-based enrichment activities on academic performance. The experimental group also expressed a high level of science learning engagement, demonstrating strong involvement, effort, and preparation in science lessons as manifested by the grand weighted mean of 3.88. Lastly, valuable comments and suggestions from Science teachers, experts, and students were provided, contributing to the ongoing improvement of the Home-based enrichment activities for Science 9.

For further researches, it is recommended: (1) ensure that students can successfully complete their learning tasks while studying remotely; (2) enhance student engagement by incorporating trivia or key insights into each activity; (3) provide additional activities to further capitalize on the intriguing nature of the learning tasks; (4) develop an online version of the home-based enrichment activities to cater students who prefer digital learning platforms; (5) provide easy access to the materials by providing a digital copy of the home-based enrichment activities through QR codes; (6) incorporate gamified activities to infuse an element of enjoyment into the learning process; and (7) incorporate more decoding activities to

promote critical thinking skills. These recommendations can be used to guide future research aimed at improving the effectiveness and appeal of the home-based enrichment activities in fostering student engagement and academic success.

## References

Alolor, D.A.C., (2017) Level of Teaching Competencies of Public School Teachers in English. Unpublished Master's Thesis, University of our Lady of Fatima.

Atmowardoyo, H., (2018) Journal of Language Teaching and Research, v 9 p 197-204 from: Academy Publication Co., Ltd. from: https://scholar.google.com/citations?view_op=view_citation&hl=en&user=YwH8SikAAAAJ&citation_for_view=YwH8SikAAAAJ:kzcrU_BdoSEC

Baraquia, L. (2019) Students' Science Engagement Scale (SSES) : Developing the Constructs to measure Science Engagement. https://www.researchgate.net/publication/339139936_Students'_Science_Engagement_Scale_SSES_for_citation/related

Bayucca, S., (2021) "Challenges Encountered and Technical Assistance Needed by Parents and Learners Utilizing Modular Distance Learning: Basis for a Proposed Support Program" *Journal of Humanities and Social Sciences, vol. 3, no. 3, pp. 128-135, Dec. 2021*

Fudge, T., (2019) "The Importance of Formatting", from: *https://purdueglobalwriting.center/*

Homedan, H.A.A., Baioumy, N., Annuar , T.B.M. , (2021) The Effectiveness of Enrichment Activities Program Based on Educational Techniques on the Quality of Mathematics Outcomes for Third-Grade Primary Students in Jordan. Human Resource Management Academic Research Society.

Kennette, J., (2019) Education Content: Deep look and Purpose from: https://licensewithmosaiq.com/education-content-and-purpose/

Lares, A., (2020) How to Organized Presentation, Communication from : https://www.shapironegotiations.com/how-to-organize-a-presentation

Regoniel, P., (2021) Data analysis: Five Essential Steps to Ensure Data Integrity, Accuracy and Reliability From: https://simplyeducate.me/2021/11/12/data-analysis

Şihmantepe, A., et al., (2021) Improving Maritime English Oral Communication Skills in an Online Environment: Engaging Students as Teams. Trends and Developments for the Future of Language Education in Higher Education

Tria, J. Z. (2020). The COVID-19 Pandemic through the Lens of Education in the Philippines: *The New Normal. International Journal of Pedagogical Development and Lifelong Learning, 1(1), ep2001.*