The Learning Performance of Grade 4 Learners: Basis for the Development of Intervention Learning Materials in Science

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Abstract: **This study aimed to determine the learning performance in Science among Grade 4 learners of Jose Divinagracia Sr. Elementary School and used the result as a basis to develop an Intervention Learning Material (ILM) in Science. A 50-item Diagnostic Test was conducted emphasizing the identified competencies in Science 4. The overall results of the learning performance of Grade 4 learners in Science is 4.85 which implies that they performed Poorly in the five topics such as Bones and Muscles, Stomach, Intestines, Kidney, Heart and Lungs, and Brain. The study concludes an Intervention Learning Material that may help develop and address the low learning performance of the learners through digital tools integration. The proposed Intervention Learning Material was evaluated as satisfactory by the evaluators and is considered as a good medium to help learners master their learning competencies.**

Keywords: **Digital tools, grade four learners, Intervention Learning Material, Jose Divinagracia Sr. Elementary School, learning performance, module.**

1. INTRODUCTION

The advent of the modern ways of delivering quality education has brought significant changes on how the world views education and pedagogy. This has been made successful through the highly active and progressive effects of globalization that made both teaching and learning intricate. The transformation had slowly taken effect on both the learners and the teachers through ICT or Information and Communication Technology. Since the society is becoming dependent in the use of technology, Philippine Education also enhanced its basic education by using technology in the teaching-learning process. The use of technology shapes our society and plays an integral part in the education sector. Educational technology can help teachers and students through providing benefits such as organization, efficiency, collaboration, communication, and virtual experiences (Andrade, 2015).

According to the Trends in International Math and Science Study (Martin, et al., 2004), Filipino grade 4 pupils scored third-to-last out of 25 nations in science, with an average rating of 332. The average worldwide grade was 489, with any country receiving the maximum rating of 565. Years later, from the same assessment test conducted in 2019, In an international evaluation of Science for Grade 4 pupils, Filipino students came in last out of 58 nations. According to the test results, the pupils "demonstrate a poor grasp of scientific ideas as well as a restricted knowledge of fundamental science facts." (Trends in International Mathematics and Science Study, 2019). Even in the classroom setting of the researcher, poor performance in Science among grade 4 learners were common. Pupils had difficulty in understanding the concept in Science thus in able to reach the passing score during formative and summative test.

In the study conducted by (Wang et al., 2014), teachers were able to realize that there are other strategies that could be used instructionally to help engage the students to meet their developmental, intellectual, and social needs. This also creates a bridge between students who are digitally users and teachers who are naïve in using digital technologies.

This study aimed to determine the learning performance in Science in terms of bones and muscle; stomach and intestine; kidney; heart and lungs; and brain. Based on the results of the study, the researcher developed an Intervention Learning Material and this material was test its validity level in terms of its content; format; presentation and organization and accuracy and up-to-dateness of information.

2. BODY OF ARTICLE

This study aimed to determine the learning performance in Science among Grade 4 learners and used this as a basis to develop an Intervention Learning Material. Specifically, it sought answers to the following questions:

1. What is the learning performance of Grade 4 learners in Science in terms of:

   1.1. Bones and Muscle;

   1.2. Stomach and Intestine;

   1.3. Kidney;

   1.4. Heart and Lungs; and,

   1.5. Brain?

2. Based on the results, what Intervention Learning Material can be developed?

3. What is the validity level of the Intervention Learning Material in terms of:

   3.1. Content;

   3.2. Format;

   3.3. Presentation and Organization; and,

   3.4. Accuracy and Up-to-Dateness of Information?

This study utilized a Research and Development (R&D) Method. According to Ahmad (2015), research and development is an investigating activity for educational matters in order to create and develop new educational products or procedures to enhance an existing material. This study also used a quantitative method to collect and analyze data obtained from the learning performance of Grade 4 learners. In this study, the researcher identified the learning performance of Grade 4 learners in Science of Jose Divinagracia Sr. Elementary School for the School Year 2019-2020. The results of the learning performance served as the basis in developing a new module for learning Science 4 lessons with digital tool integration.

The respondents of this study were 136 out of the total population of 206 Grade 4 learners of Jose Divinagracia Sr. Elementary School. All of the respondents were Grade 4 learners which consist of five sections. Sloven's Formula was used to get the appropriate number of population in this study. Purposive sampling was used in selecting the respondents of the study. Purposive sampling is a kind of non-probability sampling in which researchers use their own decision in selecting individuals of the population to participate in surveys to complete the objectives and purpose of the study (Mujere, 2016).

A 50-item Diagnostic Test was used to determine the learning performance of Grade 4 learners in Science. The test has 50 questions based on the competencies identified in Science lessons for 2nd Grading period such as functions of bone and muscle, stomach and intestine, kidney, heart and lungs and brain.

This study also used a validation tool to test the validity of the 50-item Diagnostic Test. This was to assess the content validation, the technicality of the test construction, and the grammar used in the questions by the three validators consisted of a Master Teacher in Science from a public elementary school, the Dean of Graduate School and the Principal of the Elementary Department of Holy Trinity College. Then, the 50-item Diagnostic Test was utilized in a dry run test among 20 Grade 4 learners of the same school to determine the overall test reliability using the KR20 Formula or the Kuder-Richardson Formula. To test the level of validity of the Intervention Learning Material, the researcher adapted the

Evaluation Rating Sheet of the Learning Resource Management and Development System (LRMDS), which assessed and evaluated four factors such as the Content, Format, Presentation and Organization, and the Accuracy and Up-to-dateness of Information. There were eight Science teachers who evaluated the newly developed Intervention Learning Material consisted of eight validators such as 1 Division Supervisor in Science, 1 Division Supervisor in LRMDS, 1 Division Science Coordinator, 1 Principal, 3 Master Teachers, and 1 District Science Coordinator.

In gathering the data needed for this study, the researcher first asked permission from the General Santos Division Superintendent through a letter of approval to conduct the study in Jose Divinagracia Sr. Elementary School. After the approval of the request, another letter was sent to the Public School District Supervisor through the school head to allow the researcher to conduct a study in the school. The researcher then identified the least mastered skills in Science 4 and the topic was about the functions of the different body organs for the 2nd grading period. A letter was sent to three teachers to test the validity of the 50-item diagnostic test that will be administered to the Grade 4 Science learners. After obtaining satisfactory rating in the validity of the 50-item diagnostic test, the researcher then personally conducted the diagnostic test in Science to the Grade 4 learners. Based on the results of the 50-item diagnostic test, the researcher developed an Intervention Learning Material which was validated by eight Science teachers using the adapted evaluation rating sheet of the Learning Resource Management Development System (LRMDS) of the Department of Education.

In the data analysis, the study interpreted the data that was obtained from the respondents using descriptive analysis. The data was presented in tabular form and was subjected to descriptive analysis. In this study, the following statistical tools were used to treat, analyze and interpret data that were collected. The mean from the result of learners' test were also obtained. The KR20 Formula or the Kuder-Richardson Formula was used to determine the overall test reliability of the 50-item Diagnostic Test in determining the learning performance of Grade 4 learners in Science. For the validity test, the mean was used to test the validity level of the Intervention Learning Material in terms of the Content, Format, Presentation and Organization, and the Accuracy and Up-to-dateness of Information.

3. RESULTS AND DISCUSSION

Learning Performance of Grade 4 Learners in Science

After the learners were exposed to classroom instructions in Science 4 subject on topics like Bones and Muscles, Stomach and Intestines, Kidney, Heart and Lungs, and Brain, they were tested using the researcher-made test paper. The results of their learning performance specifically in the topic Bones and Muscles are presented in Table 1a.

Table 1.1: Learning Performance of Grade 4 Learners in Science in terms of Bones and Muscles

Score Range	f	%	Description
9-10	*14*	*10.3*	Very Good
7-8	*56*	*41.2*	Good
5-6	*45*	*33.0*	Fair
3-4	*17*	*12.5*	Poor
0-2	*4*	*2.9*	Very Poor
Overall Mean Score:	*27.2*	*6.33*	**Fair**

As shown in Table 1.1, 41.2% of the Grade 4 learners got a score of 7 to 8 in the 10-item test on Bones and Muscles. Their performance is considered Good. This is followed by 33.0% of the learners got the scores ranging to 5-6 described as Fair. On the other hand, there were 2.9% of the learners who got scores of 0 and 2 which is described as Very Poor. The overall mean score percentage of the learners is 6.33 and this implies that generally, these learners performed Fair on the Bones and Muscles 10-item test. This is interpreted as the learners possess basic knowledge in terms of their learning performance on Bones and Muscles. This demonstrates that the current instructional materials did not improve the learners' performance in the Science 4 subject on the topic about Bones and Muscles. It may be assumed that they are struggling to comprehend the lesson presented. However, this result does not agree with the findings in the study of Alelaimat and Ghoneem (2012). The findings demonstrate that on the subject of learning performance, it has been reported that the outcomes of the research show that respondents in the experimental group which used modules for learning about their science modules has the

average of the 36.51, with a standard deviation of 7.81, which was regarded as a good learning performance. This is interpreted that their respondents possess an adequate level of knowledge in terms of the lesson.

Table 1.2 showed the results of the learning performance of Grade 4 learners in stomach and intestines.

Table 1.2: Learning Performance of Grade 4 Learners in Science in terms of Stomach and Intestines

Score Range	f	%	Description
9-10	23	17.0	Very Good
7-8	20	14.7	Good
5-6	46	33.8	Fair
3-4	29	21.3	Poor
0-2	18	13.3	Very Poor
Overall Mean Score:	**27.2**	**5.51**	**Fair**

As shown in Table 1.2, 33.8% of the Grade 4 learners got a score of 5 to 6 in the 10-item test on Stomach and Intestines. This performance is considered Fair. This is followed by 21.3% who got scores of 3 and 4 which is described as Poor. The overall mean score of the learners is 5.51 and this implies that generally, the learners have Fair performance in the Science 4 subject on the topic about Stomach and Intestines. The results reflect that Grade 4 learners are fair in terms of their learning performance. They only possess basic knowledge in understanding the concepts of Stomach and Intestines lessons. In order to enhance the knowledge of learners about the topic, teachers need to look for teaching strategies that are more motivating for the 21st Century learners such as videos that may help them visualize and understand how stomach and intestines work in the human body.

The results of this study were supported by the findings of the study conducted by Guilmet (2015) which found out that the learners only possess fairly substantial knowledge on the digestive system, specifically, stomach and intestines after running a diagnostic test to determine their test grades and ability to retain information. Results from the questions about the lesson on Kidney were shown in Table 1.3.

Table 1.3: Learning Performance of Grade 4 Learners in Science in terms of Kidney

Score Range	f	%	Description
9-10	3	2.2	Very Good
7-8	9	6.6	Good
5-6	38	28.0	Fair
3-4	46	33.8	Poor
0-2	40	29.3	Very Poor
Overall Mean Score:	**27.2**	**3.86**	**Poor**

As shown in Table 1.3, 33.8% of the Grade 4 learners got a score of 3 to 4 verbally described as Poor performance. This is followed by 29.3% who got scores of 0 and 2 which is described as Very Poor performance. And only 2.2% of the Grade 4 learners scored 9 to 10 which is described as Very Good performance. The overall mean score of the learners is 3.86 and this implies that generally, learners performed Poor on the 10-item test about the Kidney. This is interpreted as the learners possess low knowledge in terms of their learning performance about Kidney. This means that the existing learning resources did not help the learners to perform better in the subject. This is interpreted as the learners possess low knowledge in terms of their learning performance about Kidney. However, this result does not agree with the findings of Dobson (2012) who determined the mean scores of the summative exam of two respondents groups in physiology, including the kidney in the endocrine system and the heart and lungs in the cardiovascular and respiratory system. It was found out that the mean score of first group of respondents was in a range that corresponded to a grade of C+ or also considered as fair (77.5-79.9), whereas the mean score for the second set of respondents was above the grade of B which is considered as good (above 80.0).

Table 1.4 presents the results of the learning performance of the Grade 4 learners about the heart and lungs topic.

Table 1.4: Learning Performance of Grade 4 Learners in Science in terms of Heart and Lungs

Score Range	f	%	Description
9-10	5	3.7	Very Good
7-8	16	11.8	Good
5-6	45	33.1	Fair
3-4	35	25.7	Poor
0-2	45	25.7	Very Poor
Overall Mean Score:	**29.2**	**4.28**	**Poor**

As shown in Table 1.4, 33.1% of the Grade 4 learners got a score of 5 to 6 in the 10-item test on Heart and Lungs. This performance is considered Fair. This is followed by 25.7% who got scores of 3 and 4 which is described as Poor. And 3.7% of the Grade 4 learners scored 9 to 10 which described as a Very Good performance in the test. The overall mean score of the learners is 4.28 and this implies that generally, learners performed Poor on the Heart and Lungs 10-item test. The results showed that the Grade 4 learners have performed poorly in the 10-item test on the topic about Heart and Lungs. This is interpreted as the learners possess low knowledge in terms of their learning performance about Heart and Lungs. The functions of the heart and lungs in the human body are difficult to understand. This study contradicts the findings of Dobson (2012) entitled "The use of formative online quizzes to enhance class preparation and scores on summative exams" which determined the mean summative exam scores of two groups. The mean score of the first group was found to be in a range of a grade of C+, which is also considered as fair (77.5-79.9), whereas the mean score of the second group consisted of the grade of B, which is also considered as good (above 80.0). Given that the current study's findings revealed that respondents have a poor learning performance on Heart and Lungs, the current study rejects the previous study's findings which states that the respondents have a fair to good learning performance on the topic of Heart and Lungs.

Table 1.5 presents the results of the learning performance in the diagnostic test of Grade 4 learners about the Brain.

Table 1.5: Learning Performance of Grade 4 Learners in Science in Terms of Brain

Score Range	f	%	Description
9-10	3	2.2%	Very Good
7-8	17	12.5%	Good
5-6	40	29.4%	Fair
3-4	43	31.6%	Poor
0-2	33	24.3%	Very Poor
Overall Mean Score:	**27.2**	**4.14**	**Poor**

As shown in Table 1.5, 31.6% of the Grade 4 learners got a score of 3 to 4 in the 10-item test on Brain. This performance is considered Poor. This is followed by 29.4% who got scores of 5 and 6 which is described as Fair. And 2.2% of the Grade 4 learners scored 9 to 10 which was described as Very Good performance in the test. The overall mean score of the learners is 4.14 and this implies that generally, they performed poorly on the 10-items test about the Brain. The results revealed a poor performance of the Grade 4 learners in the 10-item test on the Science topic about the Brain. This implies that the methods used in teaching the topic and the activities given prior to the examination do not help the learners in understanding the important concepts about the lesson due to the low thinking skills of the students. However, the study of Poljicanin (2012) entitled " Daily mini quizzes as means for improving learner performance in anatomy course" presented a study after evaluating the scores of their respondents through the use of quizzes about the central nervous system, including the brain. The study determined that the average of the learners' test scores on the lesson on brain, which is 8.5, is interpreted as Good. The results of the study of Polijicanin in the individual scores range from 1.5 which is Very Poor and 13.5 which is Very Good. Thus, the average test score does not support the results of the current study.

Table 1.6 showed the summary table on the learning performance of Grade 4 learners in Science.

Table 1.6: Summary Table on the Learning Performance of Grade 4 in Science

Indicators	Mean Score	Description
1. Bones and Muscles	6.33	Fair
2.Stomach and Intestines	5.51	Fair
3. Kidney	3.86	Poor
4. Heart and Lungs	4.28	Poor
5. Brain	4.14	Poor
Overall Mean Score:	**4.82**	**Poor**

To summarize, the overall mean score of the performance of Grade 4 learners in Science was 4.82 which implies that they generally performed Poorly in the five topics such as the Bones and Muscles, Stomach and Intestines, Kidney, Heart and Lungs, and Brain. This means that the learners possess low knowledge on the topics.

Intervention Learning Material in Science 4

Based on the results of the study, there is a need to develop an Intervention Learning Material that may address the problem of low learning performance of the learners in specific topics in Science 4 such as Bones and Muscles, Stomach and Intestines, Kidney, Heart and Lungs, and Brain. Hence, the researcher crafted an Intervention Learning Material in these mentioned topics in Science. Each of the modules consists of lessons that have illustrations and pictures which would enable the learners to see what that specific part of the body looked like.

Also, the modules are integrated with digital tools which are linked to online resources such as videos, websites, and other media that can assist the learners in exploring the topics that are already provided. Each lesson in the module includes at least two activities of different levels of difficulty in order to provide the learners a chance to gradually master the skills at their own pace with the help of the Intervention Learning Material. Every lesson caters creative illustrations and informative concepts that would spark up the interest of the learners to explore the subject more given the fact that they can look at the online resources for additional learnings. An Answer Key is provided to help the learners track their own progress. Generally, the tasks given in this module are targeted to address the problems of the learners' poor performance in specific competencies in Science.

The Intervention Learning Material has five lessons discussing the Bones and Muscles, Heart and Lungs, Stomach and Intestine, Brain, Kidneys and how to take care of the body organs. Every lesson consists of information, visual aids, videos, images, online interactive games such as Kahoot, Plickers, Quizlet, puzzle, PowerPoint offline game such as jeopardy and chart organizers that talk about certain topics. The Intervention Learning Material was focused on learning with the assistance of digital tools. After every lesson, there are practice tests of multiple choice, identification, true or false, and matching type.

Validity Level of the Intervention Learning Material

The validity and acceptability of the Intervention Learning Material was assessed to ensure that it may be appropriate to the learners' learning level and that it would meet the desired outcome of the study which is to develop the understanding and knowledge retention of learners in the lessons.

Table 2: Validity Level of Intervention Learning Material

Indicators	Mean	Description
1. Content	3.71	Satisfactory
2. Format	3.65	Satisfactory
3. Presentation and Organization	3.95	Satisfactory
4. Accuracy and Up-to-Dateness	3.79	Acceptable
Overall Mean:	**3.78**	**Acceptable**

Table 2 shows the summary of validity level of the Intervention Learning Material. The proposed learning material and modules are evaluated by validators as Acceptable with a total mean of 3.78. Specifically, the learning material was Satisfactory in terms of Content with a mean of 3.71, as well as in terms of Format with a mean of 3.65, Satisfactory in terms of Presentation and Organization with a mean of 3.95, and the module was Acceptable in terms of Accuracy and Up-to-dateness of Information with a mean of 3.78. This means that the module is appropriate for the learners and may be utilized as a good medium to enhance the performance of the learners in the specific topics and competencies in Science 4.

4. CONCLUSIONS

Based on the findings, the following conclusions are made:

1. As the Grade 4 learners performed poorly in the 50-item diagnostic test in the Science lessons, there is a need to improve the teaching methods and strategies in lesson preparation for the Science 4 subject.

2. The development of the Intervention Learning Material is found to be needed now that we are in the 21st century. The goal of producing globally competitive learners is possible by exposing them to the use of digital tools.

3. The ratings of the validators on the Intervention Learning Material are acceptable and accurate which supports the fact that teachers must be open for enhancement of the learning resources of the learners. This enhancement with the help of digital tools is the future of more interactive and engaging learning experiences of the learners during the teaching-learning process.

REFERENCES

[1] Ahmad, A. (2015). Research and development (R&D). Educare. https://educare pk.com/research-and-development-rd.html#:~:text=Research%20and%20development%20(R%26D)%20is%20a%20general%20term%20for%20all,procedures%20(e.g.%20teaching%20or%20assessment

[2] Andrade, D. (2015). What is the horizon for education technology? Retrieved from edtechmagazine: https://edtechmagazine.com /k12/article /2016 /09/what-horizon-education-technology

[3] Dobson, J.L. (2012). The Use of Formative Online Quizzes to Enhance Class Preparation and Scores on Summative Exams. Advances in Physiology Education. https://journals.physiology.org/doi/full/10.1152/advan.90162.2 008

[4] Guilmet, A. (2015). The Effect of a Scientific Reading Curriculum on Overall Performance and Attitude in High School Learners. Montana Stat University.Bozeman, Montana. https://scholarworks.montana.edu/xmlui/bitstream/handle/1/9258/Guilmet S0815.pdf?sequence=1&isAllowed=y

[5] Martin, M. O., Mullis, I. V. S., Gonzalez, E. J., & Chrostowki, S. J. (2004). TIMSS 2003 International science report: Findings from IEA's Trends in International Mathematics and Science Study at the eighth and fourth grades. Chestnut Hill: MA: Boston College. Retrieved March 29, 2007, from http:// timss.bc.edu/timss2003i/scienceD.html.

[6] Mujere, N. (2016). Sampling in research. In Mixed methods research for improved scientific study (pp. 107-121). IGI Global.

[7] Poljicanin, A. (2012). Daily Mini Quizzes as Means for Improving Learner Performance in Anatomy Course. Journal on Medical Education. Department of Anatomy, Histology and Embryology, University of Split School of Medicine, Split, Croatia. DOI: 10.3325/cmj.2009.50.55

[8] Trends International Mathematics and Science Study (TIMSS) (2019). Trends in International Mathematics and Science Study https://timssandpirls.bc.edu/timss2019/

[9] Wang, S. K., Hsu, H. Y., Campbell, T., Coster, D. C. & Longhurst, M. (2014). An investigation of middle school science teachers and students' use of technology inside and outside of classrooms: Considering whether digital natives are more technology savvy than their teachers. Educational Technology Research and Development, 62(6), 637-662.