



A Comparison of Quarterly Performance in Science of Grade 7 Students in Public School

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Abstract

In a typical science curriculum with different scientific disciplines (Chemistry, Biology, Physics and Earth Sciences) taught in every quarter, it is important to determine the difference in the performance of students under each discipline. In this study, the comparison of quarterly performance in Science of Grade 7 Students was examined. Wherein, the consolidated quarterly grades in science from the previous school year (June 2018 - April 2019) from five sections with a total of 272 male and female grade 7 students were used as data. It employed a quantitative research design using a One-way Analysis of Variance (ANOVA) to determine the significant difference in the mean grades per quarter. Additionally, an interview with the science teachers who handled the samples was conducted to gather qualitative data to further explain the results. The results of this study revealed a mean of 83.50 from the combined grades in the second quarter which is the lowest among the four quarters. However, the results from ANOVA generated a significance of .123 ($p > .05$) which means that there is no significant difference between the grades in the first, second, third and fourth quarter.

Keyword: Comparison, Quarterly Performance, Science Education

Published Date: 5/1/2020

Page:421-426

Vol 8 No 05 2020

DOI: <https://doi.org/10.31686/ijer.vol8.iss5.2358>

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Abstract

In a typical science curriculum with different scientific disciplines (Chemistry, Biology, Physics and Earth Sciences) taught in every quarter, it is important to determine the difference in the performance of students under each discipline. In this study, the comparison of quarterly performance in Science of Grade 7 Students was examined. Wherein, the consolidated quarterly grades in science from the previous school year (June 2018 - April 2019) from five sections with a total of 272 male and female grade 7 students were used as data. It employed a quantitative research design using a One-way Analysis of Variance (ANOVA) to determine the significant difference in the mean grades per quarter. Additionally, an interview with the science teachers who handled the samples was conducted to gather qualitative data to further explain the results. The results of this study revealed a mean of 83.50 from the combined grades in the second quarter which is the lowest among the four quarters. However, the results from ANOVA

specific discipline is assigned in every quarter. In grade 7 for instance, the first quarter deals with Chemistry, the second quarter deals with Biology, third quarter deals with Physics, and the last quarter deals with Earth Science each with concepts and skills in increasing levels of complexity from one grade level to another, spiral progression [2]. Although the curriculum is designed in spiral nature which allows learning of concepts from concrete to abstract in gradual progress, it is often perceived difficult by the students due to the complexity of concepts [3]. In Physics and Chemistry, for instance, the way in which the ideas are presented requires the use of different levels: macro, micro, and symbolic level may cause the overworking of the memory resulting in difficulty. A study in University of the West Indies, Barbados, reported that there is significant difference in students' perception of difficult topics based on many factors, one of which is their interest in science, and the summary of finding revealed that Physics and Chemistry are found to have the highest levels of difficulty for most of the students compared to biology concepts which are more realistic and relevant [3].

On the other hand, studies have noted Biology as an autonomous discipline with a different conceptual framework from the physical sciences [4]. An interview from a junior high school teacher teaching the four disciplines described Biology as a more challenging discipline since it requires them to give more emphasis on inquiry, training the students to ask essential questions in investigating biological concepts rather than discussing the concepts to them. While a grade 6 teacher from a public elementary school in Manila described biology quarter specifically, the topic in asexual reproduction in plants as the most difficult topic for the

Furthermore, this kind of curriculum in science provides an opportunity for educators to assess how students perceive the nature of each science discipline and to compare the differences in their performance in every grading period.

In this study, the researcher determined which grading period for Grade 7 students will exhibit a significant difference among the others. Generally, to explore variations in the students' performances across all the quarters from the previous school year, the researcher used the consolidated quarterly grades, Form 18 of Grade 7 students in a public school in Manila. A methodology and results for the one-way analysis of variance among four grading periods are outlined.

2. BACKGROUND OF THE STUDY

Despite the major innovations in the curriculum and grading system, low performance in this science remains a problem. A relevant study described, that there are interrelated factors that contribute to this problem; first is poor preparation of teachers in terms, second is inefficient delivery of science content, and lastly, the lack of science culture in the country [5]. SEI- DOST & UP NISMED [6], discussed some of the problems in science education in the Philippines, these are low retention, analytical and communication skills of students. The factors that influence the low performance include the quality of teachers, the teaching-learning process, the school curriculum, instructional materials, and administrative support [6]. Also, relevant research identified that conceptions of the nature of science and scientific inquiry are specific to scientific disciplines [4]. Hence, the overall views of the teacher or the students of the nature of each discipline can be the reason for the subtle differences among the four disciplines. Thus, this study aimed to

examine if there is a significant difference among the quarterly performance in Science (Quarter I- Chemistry, Quarter II- Biology, Quarter III- Physics and Quarter IV -Earth Science) of Grade 7 students, was conducted. Specifically, the purpose of this paper is to:

1. Compare the significant difference in the quarterly performance of Grade 7 students in S.Y 2018-2019.
2. Describe the factors that affected the variance in quarterly grades based on interviews and previous studies.

3. METHODS

Sampling

Convenient cluster sampling was used to determine the samples in this study. The data were collected from a public high school in Manila, Philippines, wherein the consolidated quarterly grades in science from the previous school year (June 2018 to April 2019) from five sections with a total of 272 male and female grade 7 students were used. Table 1 shows the total quarterly grades used per section. A total sample (N) of 1088 quarterly grades were used in the study. Five sections were conveniently selected as representative sections from the higher, middle and lower section. Thus, the distribution of participants is not uniform in terms of academic performance.

Section	Quarter				Total
	1 st	2 nd	3 rd	4 th	
A	54	54	54	54	216
B	57	57	57	57	228
C	55	55	55	55	220
D	54	54	54	54	216
E	52	52	52	52	208
Total	272	272	272	272	1088

Also, during the previous school year, the data from each sample came from different grade 7 science teachers with different teaching styles and forms of assessments. It was a factor in the variance in grades per quarter for each section.

Design

The study is a quantitative research design that used the quarterly grades in science of 5 representative sections from higher, middle and lower sections of grade 7 students. To explore variations and the significant differences in the students' performances in every grading period, one-way analysis of variance (ANOVA) was used, with the grades as the dependent variable, and the grading period as an independent factor.

Procedure

The study used the consolidated quarterly grades or school form 18 from a public high school in Manila, with the permission of the school principal and adviser of five sections (Grade 7-1, Grade 7-5, Grade 7-11, Grade 7-19 and Grade 7-23).

In order to analyze the data gathered, the data were treated using a Statistical Package for Social Sciences (SPSS) software for easier and accurate results. One-way Analysis of Variance was used, with the grades as a dependent factor and grading periods as an independent factor, to generate results.

4. LIMITATIONS

The sample in this study was taken in one school only and the sections were not randomly selected, thus, the conclusion derived in the data may not be applicable to other groups. Also, this research was conducted in a public school where the population of students is considered a Mega Population, wherein, one section may consist of more than 50 students, compared to other private schools with a small population per section. Furthermore, other factors including subject teachers' experience, class population and time allotted per quarter which may have influenced the result from this research were considered.

5. RESULTS

Table 2 shows the comparison of the mean grades of the entire group per quarter. As observed in the table, the quarter with the highest mean is fourth quarter, 84.50 followed by third quarter, 84.40. Notably, this result describes that the performance of students in the fourth quarter (Earth Science) is higher among all other quarters. While the quarter with the lowest mean grade is the second quarter (Biology).

	N	Mean	SD
1 st Quarter	272	83.66	4.50
2 nd Quarter	272	83.50	5.61
3 rd Quarter	272	84.40	6.57
4 th Quarter	<u>272</u>	84.50	7.25
Total	1088		

An interview with the science teacher revealed that it is normally difficult to introduce chemistry in secondary level because the quarter includes the introduction of science processes skills before they can start the lessons in Matter. Time budget allotted and suspension of classes during the quarter were the factors identified by the teacher

that possibly affected students' learning in Chemistry topics.

On the other hand, no statistically significant difference was identified among the four quarters using one-way ANOVA. As can be seen from table 3, a significance value of .123 with a confidence interval level of

95% confidence interval level for the mean difference between the mean grades per quarter.

	Sum of Squares	df	Mean Square	F/Sig.
Between groups	213.31	3	71.10	1.93/.123
Within Groups	39960.39	108	36.86	
Total	40173.70	111		

Although there were no significant differences in students' performance per grading period, the students' performance within groups still varies in terms of mean differences per quarter. As stated in previous chapters, the convenient samples represent a cluster of higher, middle and lower sections hence, suggesting that students' performance in the second quarter is the lowest.

In terms of teachers' interviews, when asked about how the grades of students have affected the way in which they perceived each discipline, 2 out of 3 science teachers interviewed argued that based on their experience it is difficult to teach the second quarter topics. Teachers gave the following explanations:

However, 1 out of 3 grade 7 science teachers interviewed claimed:

On the other hand, two students from the samples, now in grade 8 were also asked, and their responses revealed that they find third quarter (Physics) as the most difficult because it involves a lot of computations. A relevant study described that students were not involved with the generation of equations. In explaining physical phenomena, Physics teachers use mathematics and emphasis on generating models

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The main purpose of this study was to compare if there is a significant difference among the quarterly performance in science of grade 7 students. Using one- compare the mean grades between each quarter and determine which quarter will have the lowest mean grade hence, considered being the quarter with the lowest students' performance.

Although the results have shown no significant difference in the quarterly performance, research like this can serve as an additional reference to help further improve the established practices in teaching different scientific disciplines. Moreover, based on the interview of science teachers teaching the four different disciplines, this research helped generate more insights about the subtle factors that affect the teaching-learning process.

As the educational system continues to progress to address the needs of the 21st-century science classrooms, it is still important to consider other factors and variables as a root cause of low performance of students in science. And, how the mean grades per quarter are influenced by the students' perceptions of science classroom [5] and conception of the nature of each scientific discipline. That is why the researcher plans to conduct further research in connection with comparing variations in their quarterly performances with larger participants considering the different settings (public and private schools) and students' perceptions of science classroom.

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