

The Impact of Scientific Knowledge Questions Using Google Forms in conducting review sessions in Biology

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ABSTRACT--*This study aimed to know the effectiveness of scientific knowledge questions using Google form in conducting review sessions in Biology. It sought to answer the problems with regard to the performance of the students in the pretest and posttest in the four competencies namely: description of how the nervous system coordinates and regulates these feedback mechanisms to maintain homeostasis; explanation of how protein is made using information from DNA; explanation of how mutations may cause changes in the structure and function of a protein and explanation of how fossil records, comparative anatomy and genetic information provide evidence for evolution. The study utilized the Pretest and Posttest Design and underwent pilot testing and expert validation of master teachers and a Science Coordinator. The control and experimental groups were identified using fish bowl technique. Thirty five (35) students were used in both experimental and control groups. Pretest was given to both groups. Respondents from the experimental group were asked to answer scientific knowledge questions using Google form during review sessions for five (5) weeks. On the other hand, the respondents from the control group were given conventional way of conducting a review. After five (5) weeks, posttest was given to both groups. The pretest and posttest results were gathered and analysed through appropriate statistical treatment using SPSS Volume 21. The respondents in the experimental group were also interviewed to get their perceptions in answering scientific knowledge questions. who answered scientific knowledge questions using Google form during review sessions in Biology with a mean difference of 10.94. There was a significant difference between the pretest and post test mean scores of both experimental and control groups. Furthermore, most of the students in the experimental group said that answering scientific knowledge question using Google form helps them analyze the questions, enables them to understand the lessons well and helps them recall the lessons they've learned. It suggests that answering scientific knowledge questions using Google form in review sessions in Biology develops student's analysis and deeper understanding about the concepts being taught. It can be concluded that better result is achieved since students are more engaged because videos and pictures are included in Google form. Google form is an effective tool in developing students' skill in answering and analysing higher order thinking skills questions.*

Keywords- Higher Order Thinking skill, academic, performance, Google forms

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I. INTRODUCTION

Quality education is one of the best thing the country can offer. This provides quality employment for better quality of life. Department of Education introduced K-12 program that will ensure quality education to all Filipino learners. It extended basic schooling to include a two-year senior high school and offered technical and vocational courses to students not planning to go to college, thus giving them more chances of getting employed in blue-collar work. The program substituted the 10-year basic education curriculum, which comprises of six years in grade school and four years in high school that focuses on the English language and Filipino, Sciences, Arithmetic and Mathematics, and Social Sciences.

According to the data presented by the Department of Education, the performance of the school students in the National Achievement Test has been declining and are significantly lower than the scores of elementary students. It showed that the average NAT score of high school students was significantly lower at 48.9% compared to the elementary students' 66.79%. This trend has been apparent for the past 5 years.

Low academic performance in science among Filipino students includes the use of conventional methods of teaching rather than using current teaching methods in teaching. Moreover, students inability to learn is due to low knowledge retention, poor relationships between the teachers and lack of respect. (Zoubi, 2015).

Based on a study being conducted by GED testing service last October 2014, the skills that test participants needs to prepare are questions that will pull specific evidence from a written source to support a finding or conclusion, expressing scientific information, understanding and applying scientific models, theories and processes. All of these types of questions fall on the higher order thinking skills under Blooms taxonomy. Thus, if students are bombarded with these types of questions everyday learning, the skills can be acquired.

Based on the insight and statement being provided, it is very appropriate to think of possible solutions that can increase the academic performance of the learners. With frequently giving Scientific Knowledge Questions as a form of review, learners will be more certain in answering questions that belong to higher order thinking skills. The 21st century students we have in our classroom belong to the Generation Z and they are computer natives and they learn best using technology. Thus, technology will be an advantage in helping the learners convert their short term memory to long term for them to appreciate the beauty of science

II. STATEMENT OF THE PROBLEM

The study aimed to know the effectiveness of Scientific Knowledge Questions in conducting review sessions in Biology of the grade 10 students. Specifically, it sought to answer the following questions:

1. What are the mean scores of the experimental and control groups as revealed by the pretest and posttest?
2. Is there a significant difference between the pre test and post test mean scores of the control and experimental groups?
3. Is there a significant difference between the post test mean scores of the experimental and control groups?
4. What are the feedbacks of the students after answering the Scientific Knowledge questions ?

III. CONCEPTUAL FRAMEWORK

The conceptual framework in Figure 1 was used to determine the effectiveness of scientific knowledge questions using Google form in conducting review session in Biology. The framework was built on Kevin Coomb's Input- Process- Output (IPO) model.

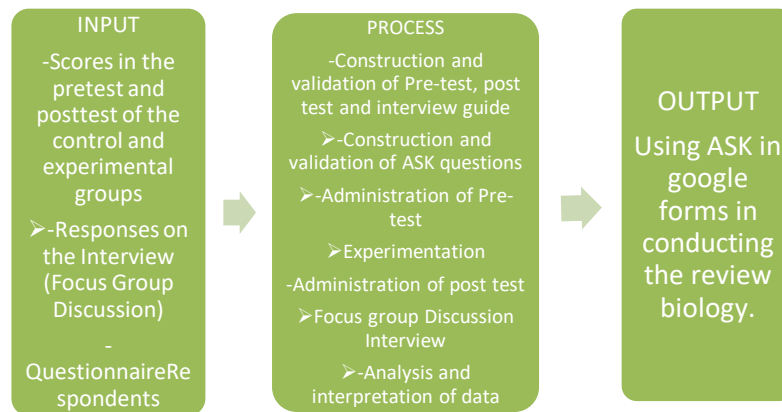


Figure 1 : The framework was built on Kevin Coomb's Input- Process- Output (IPO) model.

IV. METHODS OF RESEARCH

The least mastered skills were identified using the Achievement Test results from SY 2016 -2019. A table of specification for Pretest and Posttest were prepared based on the least mastered competencies in Grade 10 Biology. After crafting the pretest and post test, these were subjected for validation. Selection of experimental and control groups was done through fish bowl sampling. Before experimentation, the two groups were given pretest. The conduct of the review sessions was immediately given for five (5) weeks with four (4) hours per week. Scientific knowledge questions was given to the experimental group, while conventional way of giving review was given in the control group. After the five weeks, the posttest was administered to both experimental and control groups. Focus Group Discussion was given to the experimental group to determine the student feedbacks. Once all the needed data were gathered, these were summarized, tabulated, analysed and interpreted.

V. RESEARCH DESIGN

The study made use of Experimental Method using Pre-test-Post test Design (Rumrill, 2013). This design is used to identify the association between the pre-test and post test results. In this design, two groups are chosen. One group is given the treatment and the result is gathered at the end. The control group receives no treatment, over the same period of time, but undergoes exactly the same kind of test

Pre-test was given to both control and experimental groups. The experimental group was given the Scientific Knowledge Questions using Google form in the review sessions while the control group was given the tradition way of asking questions. Post test was given to both groups after five (5) weeks.

This study also used Qualitative Method using interview through focus group discussion to respondents from the experimental group to get their perceptions on Scientific Knowledge Questions using Goggle Form.

VI. SAMPLING PROCEDURE

Simple random sampling using fish bowl technique was used to determine which section will be used in this study. All grade 10 sections except for special programs were given equal chance of participation. After identifying which section will be the control and experimental group, an assigned number were given to all students in that sections. These numbers were written on small sheets of paper then rolled and placed in a box. Thirty five (35) number of papers picked out (by lottery) from the box composed of the experimental group and another 35 number of paper picked out from the box composed of the control group

VII. RESPONDENTS

This study involved the participation of experimental and control groups from Biology class in Grade 10. Grade 10 Aquino and Quirino students were chosen as the respondents since they don't belong to the higher section of the school

VIII. SOURCES OF DATA

Twenty (20) item questions were developed and used in the study. Four (4) items belonged to competency 1 which describe how the nervous system coordinates and regulates these feedback mechanisms to maintain homeostasis. Six (6) items belonged to competency 2 which explain how protein is made using information from DNA. Five (5) items belonged to competencies 3 and 4 which explain how mutations may cause changes in the structure and function of a protein and explaining how fossil records, comparative anatomy and genetic information provide evidence for evolution

Construction.

The pre-test and post-test consist of twenty (20) item questions based on the students least mastered competencies of the following: how the nervous system coordinates and regulates these feedback mechanisms to maintain homeostasis; explain how protein is made using information from DNA; explain how mutations may cause changes in the structure and function of a protein; and explain how fossil records, comparative anatomy and genetic information provide evidence for evolution.

The pre-test and post test questions had the same competency and level of difficulty.

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Validation.

The content of the pre test and post test was validated by the master teachers and Science coordinator. All items used in the pre test and post test are pilot tested. Pilot testing was done to the pre-test and post test with the Grade 11 STEM students. Test result was evaluated through item analysis, test for reliability and the value of coefficient correlation were considered to determine which are rejected, revised and retained. Among the thirty (30) questions, eight (8) was revised , ten (10) was rejected and twenty(20) was retained.

Twenty (20) item questions were developed and used in the study. Four (4) items belongs to competency 1, six (6) items belongs to competency while five (5) items are in competencies 3 and 4

Administration

The pretest was administered to both experimental and control groups prior to the conduct of review session, while the posttest was given to the two groups after the review sessions. The results of the two sets of test served as bases in determining the effectiveness of the review session using Google form.

A Focus Group Discussion (FGD) was also conducted to get the feedbacks of the students on the experimental group regarding the use of scientific knowledge questions.

IX. DATA ANALYSIS

The researcher used descriptive statistics such as mean, standard deviation and inferential statistic such as t Test using SPSS volume 21 with the help and assistance of statistician on the analysis of data

X. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Table 1: Mean Scores of the Experimental and Control Group in the Different Competencies

| COMPETENCY | Experimental | | | | | | Control | | | | | |
|------------|--------------|-------|----|----------|-------|----|---------|-------|----|----------|-------|----|
| | Pretest | | | Posttest | | | Pretest | | | Posttest | | |
| | Mean | Sd | VI | Mean | Sd | VI | Mean | Sd | VI | Mean | Sd | VI |
| 1 | 1.03 | .891 | FS | 3.43 | .815 | O | .71 | .860 | NI | 1.29 | .957 | FS |
| 2 | 1.54 | 1.314 | FS | 4.97 | .985 | O | 1.37 | .910 | FS | 1.71 | 1.152 | FS |
| 3 | 1.51 | .919 | FS | 4.17 | .785 | O | 1.20 | .901 | FS | 1.31 | .900 | FS |
| 4 | 1.26 | 1.172 | FS | 3.71 | 1.202 | VS | 1.37 | 1.165 | FS | 1.23 | 1.165 | FS |
| Total | 5.34 | 2.351 | FS | 16.29 | 1.250 | O | 4.66 | 1.893 | FS | 5.54 | 2.254 | FS |

As revealed in Table 1, the experimental group showed improvement in the different competencies as registered a total mean score of 16.29 during the posttest from 5.34 during the pretest. However, unnoticeable improvement was registered by the control group as its total mean scores minimally increased from 4.66 during the pretest to 5.54 during the post test. Moreover, homogeneity between the pretest and post test scores was observed in the experimental group as compared to the control group as the standard deviations decreased from 2.351 to 1.250 for the experimental group but increased from 1.893 to 2.254 for the control groups.

It can be inferred from the obtained results that the respondents who answered scientific knowledge questions using Google form during review improved the performance in all competencies. Thus, respondents in the experimental group were trained every day for five (5) weeks in answering scientific knowledge questions. Aside

from it, the videos and pictures were also included in the Google form which enabled student to develop deeper understanding of the Science concepts

Table 2 : t-Test Result between the Pretest and Posttest Mean scores of the experimental and control groups

| Experimental Group | | | | | | | | | | Control Group | | | | | | | |
|--------------------|----------|-------|-----------|-------|-------|---------|----------------|----|------|---------------|-----------|------|------|---------|----------------|----|---|
| Competency | Mean | Sd | Mean Diff | t | df | P value | H ₀ | VI | Mean | Sd | Mean Diff | t | df | P value | H ₀ | VI | |
| 1 | Pretest | 1.03 | 0.89 | 2.4 | 12.43 | 34 | .000 | R | S | 0.71 | 0.86 | 0.57 | 2.49 | 34 | 0.018 | R | S |
| | Posttest | 3.43 | 0.82 | | | | | | 1.29 | 0.96 | | | | | | | |
| 2 | Pretest | 1.54 | 1.31 | 3.43 | 12.04 | 34 | .000 | R | S | 1.37 | 0.91 | 0.34 | 1.4 | 34 | 0.172 | F | N |
| | Posttest | 4.97 | 0.99 | | | | | | 1.71 | 1.15 | | | | | | | |
| 3 | Pretest | 1.51 | 0.92 | 2.66 | 11.85 | 34 | .000 | R | S | 1.2 | 0.9 | 0.11 | 0.51 | 34 | 0.613 | F | N |
| | Posttest | 4.17 | 0.79 | | | | | | 1.31 | 0.9 | | | | | | | |
| 4 | Pretest | 1.26 | 1.17 | 2.46 | 9.68 | 34 | .000 | R | S | 1.37 | 1.17 | 0.14 | 0.47 | 34 | 0.645 | F | N |
| | Posttest | 3.71 | 1.2 | | | | | | 1.23 | 1.17 | | | | | | | |
| Total | Pretest | 5.34 | 2.35 | 10.94 | 25.81 | 34 | .000 | R | S | 4.66 | 1.89 | 0.89 | 1.75 | 34 | 0.088 | F | N |
| | Posttest | 16.29 | 1.25 | | | | | | 5.54 | 2.25 | | | | | | | |

As shown in Table 2, there is a significant difference between the pretest and posttest mean scores of the experimental group since the p value 0.000 is lower than 0.05 level of significance. On the other hand, there is no significant difference between the pretest and posttest means scores of the control group since the p value 0.088 is greater than 0.05 level of significance.

This implies that using Google form in answering scientific knowledge questions is effective in enhancing the competencies of the students during review sessions in grade 10 Biology because the respondents in the experimental group are more engaged since videos and pictures are included.

Table 3: t-Test Result Between the Post test Mean Scores of Experimental and Control groups

| Competency | Group | Mean | Sd | Mean Diff | t | df | P value | H ₀ | VI |
|------------|--------------|-------|------|-----------|-------|----|---------|----------------|----|
| 1 | Experimental | 3.43 | 0.82 | 2.14 | 10.09 | 68 | .000 | R | S |
| | Control | 1.29 | 0.96 | | | | | | |
| 2 | Experimental | 4.97 | 0.99 | 3.26 | 12.71 | 68 | .000 | R | S |
| | Control | 1.71 | 1.15 | | | | | | |
| 3 | Experimental | 4.17 | 0.79 | 2.86 | 14.15 | 68 | .000 | R | S |
| | Control | 1.31 | 0.90 | | | | | | |
| 4 | Experimental | 3.71 | 1.20 | 2.49 | 8.78 | 68 | .000 | R | S |
| | Control | 1.23 | 1.17 | | | | | | |
| Total | Experimental | 16.29 | 1.25 | 10.74 | 24.66 | 68 | .000 | R | S |
| | Control | 5.54 | 2.25 | | | | | | |

As seen in Table 3, there is a significant difference between the post test mean scores of the experimental and control groups since the p values in all competencies are less than 0.05 level of significance. Hence, using Google form in answering scientific knowledge question is better than using conventional way of asking question.

Feedbacks of the students after answering the Scientific Knowledge questions

To know the feedback of the respondents after answering the Scientific Knowledge Question a focus group discussion was done. Ten (10) respondents from the experimental group were asked individually. All of the respondents said that Google form was interesting because they were motivated to answer the questions. Whenever they got the wrong answers they were able to learn something about the concept because it was being explained thoroughly. After answering the questions and submitted the answers, they could immediately identify their correct responses. Nine (9) students out of ten (10) said that answering scientific knowledge questions helped them develop the skill in analysing the questions because some of them were difficult. Six out of the ten respondents said that answering scientific knowledge questions helped them understand the lesson well, it gives them additional information about the topic being discussed because there are some videos and pictures included in the questions, helped them recall the lessons that they learned and lastly they say that it was hard at first to answer the questions but after a couple of days of doing it, they were used to that type of questions and easily answer the questions. Four (4) out of ten (10) respondents say that it gave them happiness and satisfaction when they were answering the questions especially when getting the correct answer.

XI. CONCLUSION

Based on the analysis and interpretation of data, the following are hereby summarized:

1. There was an improvement on the performance of the students in the experimental group who answered scientific knowledge questions using Google form in review sessions in Biology with a mean difference of 10.94.
2. The posttest mean scores of the experimental group is significantly higher than their pretest means score, while the control group mean score in both tests are the same.
3. There is a significant difference between the posttest mean scores of the experimental and control groups since the p values in all competencies are less than 0.05 level of significance.
4. The feedback of the respondents after answering the scientific knowledge questions are as follow:
 - a. Almost all of the respondents said that it helped them analyze the questions
 - b. Most of the respondents said that it helped them understand the lesson well, give additional information about the topic being discussed, recall the lessons that they learned in class and it was hard at first but they learned to answer the questions after a couple of days
 - c. Some of the respondents said that it gave them happiness when answering the questions especially when they got the correct answers

Based on the findings of the study, Goggle Form is an effective tool in developing students' skill in answering and analyzing scientific knowledge questions in the review sessions in grade 10 Biology. Moreover, using Google form in answering scientific knowledge questions is effective in enhancing the competencies of the students during review sessions in grade 10 Biology. Furthermore, using Google form in answering scientific knowledge questions is better than using conventional way of asking questions in grade 10 Biology. The respondents in the experimental group shows positive feedback in answering scientific knowledge using Google form in the review sessions in Biology.

XII. RECOMMENDATIONS

In view of the findings and conclusions of the study, the following recommendations are presented:

1. The teachers may use Google Form in asking questions while teaching Biology 10.
2. The students may use Scientific Knowledge Questions to develop their deeper understanding about Science concepts.
3. The School administration may support the use of Scientific Knowledge Questions by providing more computer units for the teachers to deliver the lessons in this manner.
4. A similar study may be conducted to validate the result of output of these undertaking

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