

# INSTRUCTIONAL IMPLICATIONS OF THE SURVEY ON COGNITIVE LEVEL IN EARTH SCIENCE OF SECONDARY SCHOOL STUDENTS IN JAPAN AND PHILIPPINES

Education for Specialized Subject Matter and Field  
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## I. Introduction

This study analyzes the instructional implications of the survey on cognitive level in Earth Science (ES) of secondary school students in Japan and the Philippines. It was primarily based on the perspective of assessing the cognitive level in ES of the secondary school students in the two countries for the purpose of enriching the national curriculum designed for general public high schools especially for the Philippines. Furthermore, it aimed to: (1) determine the effect of the different existing science curricula in the Philippines on the students' level of understanding of earth science concepts; and (2) compare the Earth Science curricula of both countries in terms of content and teaching pedagogies. Likewise, the results of the survey were the basis for developing instructional materials in Earth Science.

## II. Rationale of the Study

Knowledge in Earth Science is not only for the sake of learning but also for survival. Despite this fact, at eighth grade, on the average, only 13% of the total instructional time for science was devoted to earth science and 9% to environmental science (TIMSS 2003). This accounted for the very few research in this subject area.

The results from TIMSS 1995, 1999 and 2003 that the mean science scores of 8<sup>th</sup> graders in the Philippines were 395, 345 and 377 against the international mean of 516, 488 and 489, respectively, were very alarming. For these reasons, then that this research was conducted.

## III. Methodology

A 30-item multiple choice test in Earth Science was administered to the sample populations. There were 191 8<sup>th</sup> graders in Chiba and Kumamoto prefectures (Japan Junior HS or JJHS) and 480 2<sup>nd</sup> year high school students in Manila and Pangasinan province in the Philippines as respondents. They were between ages 13-15 years.

In this study, the Philippine schools were classified as: science high school (SHS); general public high schools (GPHS) in Metro Manila (MM) and province (PROV); and barangay high school

(BHS). BHS is also a GPHS but is situated within the rural community. These schools differ in science curricula they implement.

Students' responses were analyzed through SPSS and chi-test.

Instructional materials were developed and tried out in the Philippine schools. However, in this paper, only the results of the survey on cognitive level in earth science will be discussed.

## IV. Results and Discussions

### A. Japan

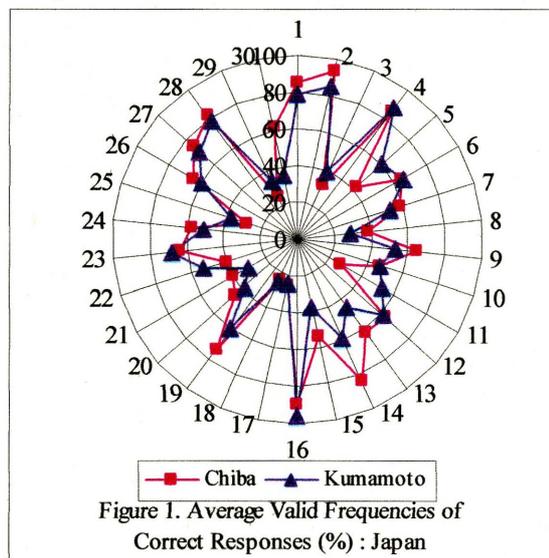


Figure 1. Average Valid Frequencies of Correct Responses (%) : Japan

As seen in fig 1, the number of JJHS students who answered correctly was high in 7 items namely: 1, 2, 4, 14, 16, 27 and 28. There were 70-93% who answered accurately the questions related to planet, atmosphere, fossil, sedimentation, moon, and erosion. Fifty (50%) to 70% gave the correct answers for 10 items and 25-50% in 13 questions associated with earth's seasons, rocks and minerals, wind-directions, layers of soil, and earthquake waves.

In an average, 55% of JJHS students gave the correct answers to the test items.

It can also be inferred from the figure that there is homogeneity in the performance of the JJHS students from either the urban and semi-rural areas.

## B. Japan vs. Philippines

Just like their Japanese counterparts, most Filipino students gave the correct responses for test items related to fossil, moon, planet, and atmosphere. The percentage of students who responded correctly was between 70-100%.

In an average, 72-93% JJHS students gave the correct responses in seven (7) items while there were 71-100% GPHS students who responded correctly in the same number of items. To name a few, those items related to meteorology (Q2), wind breeze (Q5), measuring air temperature (Q22) and others.

There were only four (4) items answered accurately by 50-67% GPHS students as compared to JJHS 10 items at 62-67%. These questions were on sedimentation (Q1), rock (Q3), erosion (Q23) and layers of soil (Q29).

However, there were 18 items answered correctly by 5-49% GPHS respondents as compared to 13 items of 25-49% JJHS. These questions pertained to rocks, wind-directions, satellite, earthquake, earth's rotation, and layers of soil. This can be possibly due to the difference in science curricula of two countries. In Japan, some of these concepts were not yet discussed among 8<sup>th</sup> graders.

The discrepancies in the results for SHS and JJHS can be explained by the fact that SHS students were carefully selected from among the top 10% elementary graduates nationwide while the sample schools in Japan were general public high schools. So, the basis for comparison was not equal.

## C. Philippine Schools

Again, it can be depicted in fig 2 that there is wide range in the performance of the Filipino students in ES.

In an average, 66% of SHS students responded correctly in the test items; the range was 10-95%. To add, 70-95% responded correctly in 16 items; 50-69% in seven (7) items; and 10-48% in seven (7) items.

In GPHS-MM, there were 60% respondents who gave the correct answers; the highest was 100% while the lowest was 6%. Thirteen (13) items were answered correctly by 70-100% of the respondents in GPHS-MM; five (5) items by 50-61%; and 12 items by 6-49%.

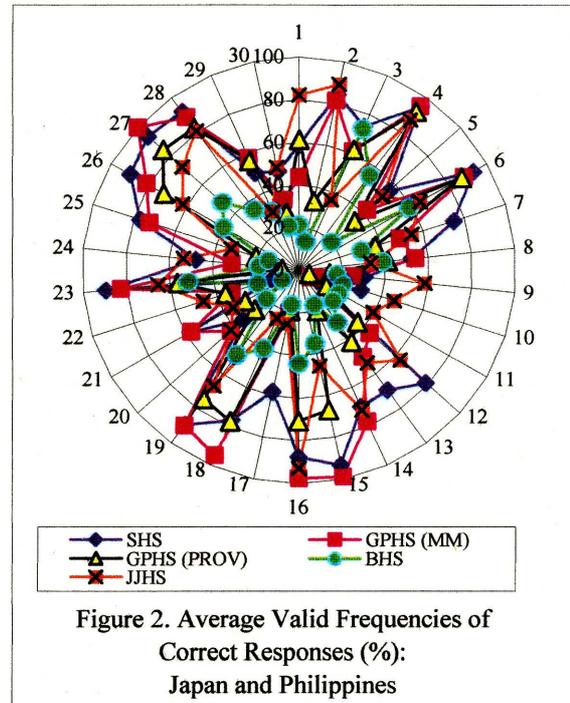
Meanwhile, the average number of GPHS-PROV students with correct answers was 46%; the range was 5 to 92 %. Seventy (70%) to 92% of the students responded correctly in eight (8) items; 56-67% in five (5) items; and 5-41% in 17 items.

However, in BHS only 31% of students responded correctly in most items; the range was 9 to 73%. Also, only one (1) was answered accurately by

73% BHS respondents; three (3) items by 51-59%; and 26 items by 9-49%.

Among these items, it was in Q11 (minerals) and Q22 (measuring air temperature) where the frequencies were lowest; 6% and 13%, respectively.

To sum it up, students from SHS scored highest with a mean of 66%; followed by GPHS-MM at 60%; GPHS-PROV at 46%; and lowest was BHS at 31%.



## V. Conclusions and Implications

The following conclusions and implications were drawn from the findings and analysis:

- (1) There is homogeneity in the performance of Japanese students as compared to the heterogeneity of Filipino students' performance;
- (2) Japanese students outperformed their Filipino counterparts;
- (3) In Japan, teaching pedagogies were basically exploratory, holistic and experiential in nature;
- (4) The Earth Science curriculum in the Philippines must be trimmed down putting greater emphasis on quality rather than quantity;
- (5) Science teaching pedagogies in the Philippines must include proper emphasis and integration of concepts; and
- (6) For further research, the proposed lesson plans should be tried-out to different types of secondary schools in the Philippines.