Language Used in the Science Test: Its Effects to Meranao Students Test Performance

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Abstract: Learning is infinite process of collecting information, knowledge and skills. However, many factors will influence and hindered effective learning process. One of these factors is the language use in the teaching-learning process, and the language use in the test. This study aimed to investigate the effects of language use in the science test and the students' performance in the test using experimental research design. The respondents were the grade 7 Meranao students in MSU-Balindong Community High School group randomly through matched – paired and distributed to control group and experimental group. Control group were the test takers using English language, while there were two experimental groups (E_A and E_B). E_A were the test takers using Filipino language, and E_B were the test takers using language of their choice (English, Filipino and Meranao). Instruments used were the TIMSS-Like test and vocabulary test in three languages; English, Filipino and Meranao dialect. Using Analysis of Variance, findings revealed that the group exposed to Filipino language test obtained highest mean gain score, followed by the group exposed to their own choice of language. More so, vocabulary knowledge has positive significant relationship to the students' performance in Science TIMSS-Like test items. Therefore, students performed better on a test if the language use is the language, they commonly use every day. Congruency of language use in teaching and in the test improves students' performance. Wider vocabulary knowledge also enhances students' performance. Thus, Science teachers should incorporate science vocabulary in teaching scientific concepts to provide effective and meaningful learning.

Keywords: language in the test, students' performance, Meranao students

1. BACKGROUND OF THE STUDY

1.1 Philippine Performance in Science

Philippine education system is very much concern about the alarming poor performance of Filipino students in Science and Math on TIMSS survey. Preliminary report of IEA which presented data for seventeen (17) countries, Philippines ranked 15th and 17th for grades 5 and 9 respectively (Table 1). The results were still the same in the TIMSS 1994. TIMSS-R in 1998 features the translation of the English version of the test items in Filipino language for Filipino participants, for which only 15 schools or 10% of the total schools sampled chose to take the Filipino version of the test (TIMSS-R, 2000).

Likewise, the National Elementary Achievement Test (NEAT) in 1999-2000 revealed that Filipino pupils obtained 48.61% only in answering correctly the science questions. This score does not improve in recent years (https://infasci.wordpress.com module-1-week-1, Philippine-situation. Retrieved 20/10/19). ABS-CBN news as mentioned by Read (2016) reported that in the area of education and innovation, Philippines ranks seventh among the nine Southeast Asian nations. Sometimes, Filipino students will top international Science competitions, but they usually come from science high schools with special programs (Dela Cruz, 2012). Philippines were falling behind Singapore, Brunei, Malaysia, Indonesia, Thailand and Vietnam in Math and Science. Because of the alarming poor performance of the Filipino students in math and science, Philippines is no longer participating the TIMSS test survey since 2007.

In the recent TIMSS test survey year 2015, Singapore rank on top in Science. According to the data Singapore consistently rank on top in Science and math since 1995 to 2015 TIMSS test survey. Read (2016) mentioned that Singapore, Hong Kong, Korea, Chinese Taipei, and Japan continue to dominate international rankings for math and science with Singapore as the overall top performing country.

The research report published by the IEA's TIMSS & PIRLS International Study Center at Boston College (2016), revealed that there were 23 points gaps at the fourth grade and 48 points gaps at the eighth grade between the top performing countries and the next highest performer countries. According to them East Asian countries were strong in science despite of varied results in each TIMSS test survey.

Table 1 Scores and Ranks of the Philippine Performance in Math and Science

Scores and Ranks for Eighth-Grade Students, 2003				
Country	Math Score	Math Rank	Science Score	Science Rank
International Average	466		473	
Philippines	378	41	377	42
Indonesia	411	34	420	36
Malaysia	508	10	510	20
Singapore	605	1	578	1
Japan	570	5	552	6
USA	504	15	527	9
Scores and Ranks for Fourth-Grade Students, 2003				
International Average	495	-	489	-
Philippines	358	23	332	23
Chinese Taipei	564	4	551	2
Hongkong SAR	575	2	542	4
Singapore	594	1	565	1
Japan	565	3	543	3
USA	518	12	536	6

Source: International Association for the Evaluation of Educational Achievement

1.2 Philippine Schools and Students Predicament in Science

Science is a very interesting and somewhat difficult subject. According to dela-Cruz (2016) science is an excellent subject and part of the three kings of school subjects worldwide. However, in the Philippine schools, different factors are considered hindrance to make science teaching and learning more effective. Based on experiences and observations, common problems and predicament in science teaching and learning were the following.

1.3 Curriculum

According to Rabino (2014), Philippine curriculum in science and mathematics used in high school was old. Accordingly, curriculum and syllabus in science should encourage learning, individualized and contextualized. Philippine has been lagging behind other developing countries in the ASEAN region in terms of educational system and curriculum, For the Philippines to catch up with the rest of the world; K-12 educational system was implemented in year 2011 until to date. In this educational system, many innovations were introduced to the curriculum from 10-years scheme shifted to 12-years scheme in basic education. Among disciplines or subjects, Science is one of the subjects that undergo major revisions. Major features are the decongestion of the competencies and spiral progression manner for the junior high school science. *Is the shifting of the Philippine educational system from 10 years to 12 years basic education improved the Filipino students' performance in Science?* This question is still debatable and researchable. Looking on the K-12 curriculum guide for science, science subject started in Grade 3 level onwards. There is no science subject in Kindergarten up to grade 2 (K to 12 Science Curriculum Guide, August 2016,

http://lrmds.deped.gov.ph/). But according to Philippine Education Secretary Leonor Briones, students' performance in science and mathematics are improving following the implementation of the senior high school program (Janvic Mateo; The Philippine Star March 21, 2019 - 12:00am).

1.4 Recruitment Process

Recruitment of teachers is very crucial and factor for ensuring quality education. Based on experienced and observations in the Philippine settings, the old practice but still existing, many applicants in teaching positions were hired despite of having not earning a degree in education. Furthermore, in assigning of teaching loads, many teachers handling science subjects that are not a science experts and non-science specialized. If these issues and existing conditions will not be corrected, then Filipino students' performance in science will remain poor forever. Subject expertise is necessary in the delivery of instruction to the learners (Valdez, 2015).

1.5 Teaching Strategies and Instructional Materials

Teaching is both an art and science. Teachers teaching strategies have great impact on students learning achievements and academic performance. According to the research findings of Rabino (2014), science teachers teaching strategies greatly affect the learning outcome of the students. However, teachers find it difficult to design varied teaching strategies particularly when there is scarcity of instructional materials in the school. Designing and planning different teaching strategies are also affected by different factors such as the availability of instructional materials, facilities, equipment and class size. Valdez et al. (2015) mentioned that teaching science through hands-on and activity-based improved students' critical thinking

and avoids misconceptions. A teacher who teaches on its field expertise can easily shift her teaching strategies as needs arise and can design authentic instructional materials in the absence of such.

Moreover, class size, science facilities and equipment greatly affect teaching performance as well as students learning performance. Research findings revealed that field of specialization, books, laboratory equipment, and trainings are significantly correlated to the teachers teaching performance in biology (Valdez, 2018). Availability of instructional materials and other teaching and learning resources needed to teach and learn is very important in delivering the lessons effectively to the students (Aguado, Garcia, Laguador & Deligero, 2015).

Science teacher must be creative enough to design varied teaching strategies and instructional materials suited to the individual differences of the learners. Congruency of teaching strategies, instructional materials and students' intelligences and differences will surely address in solving the Filipino student's poor performance in science. To solve this problem, science teachers and all others in the field of teaching must regularly attend and sent to seminar workshops and other teachers' trainings to enhance their pedagogical content knowledge.

1.6 Engagement and Support in Science

Lack of engagement and support in Science in the Philippine schools greatly affect the Filipino students' performance. How can quality education be implemented particularly in *Science if the teacher who teaches the subject is misfit? How teachers can perform better in class if there are no available instructional materials? No laboratory facilities? And handling a large class or overpopulated classroom size?* With this, there will be no such statement "students must be provided a class environment conducive for learning".

Looking on the budget appropriation of the Philippine schools before Duterte administration as indicated in the data of UNESCO and as presented by Rabino (2014), Philippine financing investment on education is very limited. The government only spend 3.3% of their GDP on public educational institutions for all levels of education while other countries like Malaysia and Thailand 28% and 40% respectively at all levels of education.

In Duterte administration, Philippine education continues to receive the highest allocation in the proposed 2019 budget with a total budget of P659.3 billion, up by P72.2 billion, or by 12.3 percent, from its cash-based equivalent of P587.1 billion in 2018 (Republic of the Philippines, Department of Budget and Management; Retrieved 20/10/19). *Is this a sign and assurance already that the Filipino students will perform better in Science and Math if Philippines will participate again in the TIMSS 2019?* Investing and supports in developing cultural engagement in science is certainly contribute the improvement of the Philippine Schools and improve

students' performance not only in Science but in all other subjects as well.

1.7 Language Use

Philippines composed of different cultures. Each culture speaks different languages which results to multilingual practices of Filipino people, but Filipino is the national language of Philippines. Recalling the TIMSS-R 2000, TIMSS test survey was translated into Filipino language for the Filipino test takers. However, very few (10%) of the total school sampled participated in the survey. As a result, there were two questions not answered. *First, does the language of the test make significant difference in performance? Second, would Filipino students perform better if the students themselves were made to choose the language of the test?*

As observed and experienced, language barrier is a contributory factor that hinder the effective transmission of knowledge and concepts from the teachers to the learners and vice versa, particularly among indigenous and cultural minority students. Thus, I am motivated to look into how language used in Science test affects or influence the Meranao students' performance in science test.

2. METHODOLOGY

2.1 Research Locale

This survey was conducted at MSU-Balindong Community High School. This school are among the thirteen (13) community schools of the Mindanao State University Marawi Campus which considered as the feeder schools of the University. The school is located along highway going to Cotabato City from Marawi City. The school was purposively selected since it is one of the best performer schools in the System-wide Admission and Scholarship Examination given by the MSU System.

2.2 Respondents and Sampling Procedure

A total of 72 grade seven students at MSU-Balindong High School participated and randomly distributed into three groups. Group 1 was the control group and assigned to take English language Science test. Group 2 the experimental group A assigned to take Filipino version of Science test and the group 3 (experimental group B) assigned to take Science test according to their own choice of language. Groupings were done through random sample using drawing lots. Prior to drawing lots, students were matched paired based on their grade in Science during the third quarter. Student who draws number 1 was assigned as group 1, while those who drawn number 2 and number 3 was assigned to group 2 and group 3 respectively. After assigning their groups, students who were assigned in group 3 was asked to select their preferred language to be used in the Science

test. In this group, 3 or 12.5% chose English version science test, 5 or 20.83% chose Filipino and 16 or 66.67% chose Meranao version science test. Each group consisted of 24 students.

2.3 Instruments

There were two instruments used in the survey. First was the IMSS-like evaluation test constructed by DOST-SEI. The test was patterned from TIMSS-R questions to assess the higher order thinking skills of the students. Second was the science vocabulary test patterned after the words in elementary science and mathematics test designed by UP – Science Education Center (1983). The statement in each item were written in context such that the vocabulary words tested were underlined so that the students chose the meaning of the word as is it used from the options given.

English version of TIMSS-like questions and the vocabulary questions were translated into Filipino version and Meranao version (native dialect of the respondents). The original version and translated test items were pilot tested and validated. After reliability and content validity, 55 items in the TIMSS-like questions and 45 items in the science vocabulary test were generated and reproduced as survey questionnaires.

2.4 Statistical Treatment

Data gathered from the survey were analyzed using descriptive statistics, Pearson r, and Analysis of Variance (ANOVA). Pearson r was use to established the relationship of variables, while ANOVA was used to determine the significant differences of variables. SPSS software was use in the computation.

3. RESULTS AND DISCUSSION

As shown in Table 1 students who took Filipino version science test obtained higher mean score, followed by the students who took the science test according to their preferred or choice language. It further shows that students who chose Filipino version test (group A) showed homogeneity in answering the test, indicating that there is uniformity in their understanding of the concept being tested. The semblance of heterogeneity manifested by experimental group B implied that this student varies in their understanding due to the fact that they are taking different language version of test.

Comparing to the overall mean score and the group mean score indicated that if the students are exposed to Filipino language, they performed better on the Filipino language test. Furthermore, the mean scores obtained by experimental group A is 0.46 higher than the overall mean score. Research findings of Acuna and de Guzman (1987) supported the findings of this study stating in their research findings that students did better in Filipino

language test in Science than in English language test. The relational terms in the test is better understood in Filipino than in English language. It is also contending that one component of Filipino language is easier to understand.

Table 1 Students Mean Scores and Standard Deviation in the Test

Groups	N	Mean	Standard deviation
Group1: Control group (English version test)	24	15.958	4.339
Group 2: Experimental A (Filipino version test)	24	16.792	3.999
Group 3 Experimental B (own choice language)	24	16.177	5. 939

On the other hand, group C who took science test according to their own choice language of the test rank second. This implied that they performed better than the control group (who took the English version science test). Research findings of Zelime, et al (2018) had similar stand indicating in their findings that pupils have significantly higher marks in the tests written in Kreol Seselwa than in English.

As depicted in Figure 1, control group mean score is 37% lower than the overall mean score, while the experimental group B is only 16% lower than the overall mean score. But the notable result is the 46% higher mean score of the experimental group A as compared to the overall mean score. The results in the vocabulary test are similar to the results of the TIMSS-like test wherein, students who took Filipino version performed better than their counterpart.

The findings of this study inferred that when the language of the test is the common language where the learners are exposed to, they performed better in the test. According to Plonski, Teffera and Brady (2013), there are about 26 African countries use English as their official languages and in most cases, it is also the medium of instruction in schools. In their case, there is a congruency of languages. In the Philippine schools more specifically the research locale of this study, the science teachers usually use multilingual in teaching and most often they use the native dialect of the place. Likewise, Philippines national language is Filipino and most of the time the students are exposed to Filipino language particularly Meranao are usually using Filipino language in talking their friends, peers and in social media. They are exposed mainly in Filipino language.

Table 2 revealed that positive correlation exists between the students overall mean scores in the science test and the vocabulary test at 0.05 level of significance ($r = 0.241$, $\alpha = 0.041$). This implied that the wider range in vocabulary knowledge, the better the performance in the test. One reason why the Philippines has a very low performance in Science is due to the difficulty of students in identifying the concepts and skills, that is probably because of poor vocabulary knowledge.
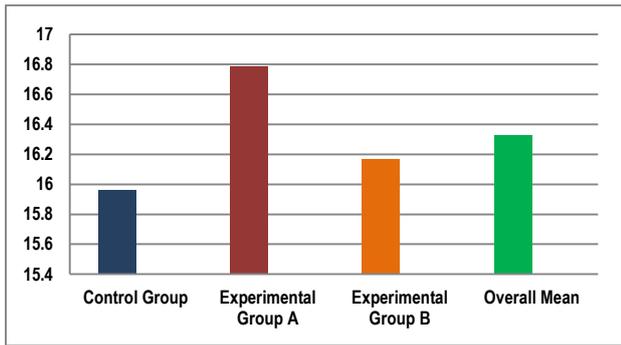
Figure 1 Comparison of the Group Mean Score and Overall Mean Score

Table 2 Relationship between Overall Mean Score and the Vocabulary Test

Score	Mean	SD	Correlation	Sig.	Decision
General Science	16.306	4.776	0.241	0.041	Ho rejected
Vocabulary	19.542	4.645			

Table 3 Analysis of Variance of the Science Test Scores Obtained by the Groups

Source of variation	SS	Df	MS	F	Sig.	Remarks
Between groups	9.06	3	3.019	0.131	0.941	No Significant Difference
Within groups	3218.3	140	22.987			
Total	3227.36	143	26.006			

Analysis of variance revealed that the mean scores obtained by the three groups did not differ significantly, probably due to limited number of respondents and or the number of items in the test (Table 3). This result is consistent with the findings of Castillo (1999), which claimed that language use has limited effect on academic performance. The dilemma on what language to use for science and mathematics instruction has remained for some time. However, based on the results of the study, the Filipino students' respondent performed better in the Filipino version test.

Likewise, the findings of this study do not support the results of a similar study, which claims that the school languages are significantly related to science test scores (Orlich et. al, 1998). Castillo (1999) claimed that the effect on language use on the overall academic performance varies by the type of the language and the type of the test that is administered.

Although English is the official medium of instruction in teaching science in the Philippines, but in reality, science teacher usually uses Filipino or vernacular language in teaching and discussing the concepts which resulted to incongruence of languages in the medium of instruction and in the test.

The limited effect on the language used and the performance of the respondents in the test may indicate that the respondents are not familiar and not used to answer TIMSS –like test items. Furthermore, the respondents may not understand the terms used in the questions, probably due to limited knowledge in vocabulary.

4. CONCLUSION

The results in this study concluded that congruency of language is very important. Language use in the medium of instruction in teaching must the same as the language use in the test. It can also be concluded that the more frequent used language in class and by the students positively influence in improving students' performance in the test.

Moreover, vocabulary integration in science teaching will improve students' performance in the test. It is believed that students' performance is greatly influenced and conditioned by teaching performance of the teachers. This is one the common dilemmas faced by the Philippine schools and students as well. Thus, science educators and alike are task for total commitment to improving the Filipino learners.

5. RECOMMENDATIONS

The positive correlation between the students' performance in the TIMSS-like test and vocabulary test implied that vocabulary knowledge is a tool for the students to perform better in their academic subjects. Therefore, it is recommended that teachers should incorporate science vocabulary in teaching science subjects.

To improve Filipino performance in Science, factors and predicament in successful science teaching and learning should be addressed particularly the curriculum, recruitment, instructional materials, and support and engagement in science. According to Dela Cruz (2016), lack of support for a scientific culture reflected in the deficiencies regarding the school curriculum, the inadequate teaching learning process, insufficient instructional materials and lack of teacher training are the main factors that account for the low performance of Filipino in science.

Teachers must ask questions that are on higher order thinking to challenge the critical thinking of students. Furthermore, teacher's training institution must conduct a comprehensive seminar workshop on teaching strategies or on the development/enhancement of teacher's pedagogical content knowledge. Similarly, the educational administrators should send their teachers for continuous professional development and in-service trainings. Lastly, further study related on this study can be conducted in other areas order to triangulate results and for updates.

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