Students' Performance in National Achievement Test using an Inquiry-based Science Teaching in Public Secondary Schools

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Abstract- Inquiry-based teaching encourages students to learn by themselves. Teachers help students generate their own content-related questions and guide the investigation that follows. This method of teaching enhances student engagement, academic achievement and higher order learning outcomes. In this study, the researcher assessed the performance of the fourth year students in Science in which inquiry-based teaching was applied. The National Achievement Test result, as an outcome, was obtained from the Department of Education. The data of the 18 public high schools in Biliran Division, Philippines was analyzed. Results showed that majority of the students were on the "Average Mastery" in Science. This suggests that the academic level of achievement of the students in Science still needs to be improved. Inquiry-based teaching is a newly introduced method and teachers may require more trainings in this type of teaching. Other innovative approaches in teaching–learning Science for secondary students are greatly encouraged to increase the National Achievement Test result. The application of these approaches, however, should be enhanced with trainings for skill's development of Science teachers and with enough learning resources.

Keywords- Outcomes-based learning, outcomes-based education, teaching methodology, public schools, Department of Education

1 INTRODUCTION

The knowledge society we now live in requires new thinking about what represents effective and engaging teaching and learning. Educators are now faced with challenge knowing former conceptions of knowledge, minds and learning no longer fits the current society we live now. The power of inquiry-based approach to teaching and learning has the potential to make it.

To further realize this thrust, the recent curriculum in science education envisions the development of scientifically, technically, and globally literate individuals who are able to solve critical problems, innovative and creative citizens capable of transforming changes and deliberate information in an effective and efficient way. This assumption indicates the necessity of transforming the approaches of science instruction to something constructive - producing self-determining learners through inquiry teaching and learning.

Accordingly, Smith [1] stated that teachers play an active role throughout the inquiry learning process by establishing an atmosphere where ideas are respectfully challenged, tested, redefined and viewed as improvable, moving learners from a position of wondering to a position of enacted understanding and further questioning. Stephenson [2] also agreed that this teaching approach honors the complex, interconnected nature of knowledge construction, striving to provide opportunities for both teachers and students to collaboratively build, test and reflect on their learning.

However, Gutierez [3] mentioned that despite ongoing teacher professional development efforts, it was observed that there still exists an uncertainty about how inquiry is utilized in Science classes and how it affects students' performance in the subject. In the Philippines, the concept of inquiry-based teaching is not particularly new to teachers. Yet, its proper utilization seems to be coupled with many challenges and confusion. Since little is known about the students' performance in national administered test in which Science teachers understand and utilize inquiry-based in the actual teaching contexts, hence, this research was conducted. The level of performance of the students in the National Achievement Test in Science during SY 2014-2015 was used as reference for this research.

2 METHODOLOGY

2.1 Research Design and Data Gathering Procedure

The descriptive design was used in the study. For the information on the performance of the fourth year students in the National Achievement Test (Year 2015) in Science, the researcher obtained the data from the Department of Education website [4].

2.2 Research Locale

The study covered 18 Public Secondary Schools in the Division of Biliran, Philippines consisting nine districts. These districts were Almeria, Biliran, Cabucgayan, Caibiran, Culaba, Kawayan, Naval North, Naval South and Maripipi.

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2.3 Data Scoring

To determine the level of performance of the National Achievement Test of the students, the Department of Education description on Mean Percentage Score (MPS) was used.

100% - 96%	- Mastered
95% - 86%	- Closely Approximating Mastery
85% - 66%	- Moving Towards Mastery
65% - 35%	- Average Mastery
34%- 15%	- Low Mastery
14%- 5%	- Very Low Mastery
4% & below	- Absolutely No Mastery

2.4 Statistical Analysis of Data

Data in this study was analyzed using descriptive statistics such as weighted mean, percentage and frequency counts in describing fourth year student's National Achievement Test performance in Science.

3 RESULTS AND DISCUSSION

3.1 Students' Performance in National Achievement Test in Science

The performance of the students was described using the Mean Percentage Score (MPS) to indicate the percentage of correctly answered items in a test (Table I). The National target MPS is 75% and above. As revealed in the table, fourth year students in school number three (3) had an MPS of 66.25, with mean of 39.75 and standard deviation of 4.91, interpreted as "Moving towards mastery". This shows that most of the students in this school correctly answered almost 40 of a 60-item test in Science subject with moving towards mastery.

On the other hand, majority of the students obtained MPS ranging from 35-65, interpreted as " Average Mastery" while the students in school number 2 obtained MPS of 33.94 with a mean of 20.36 and standard deviation of 6.43 interpreted as "Low Mastery". Low mastery means that the students in this school correctly answered almost 21 of the 60-item test in Science subject. The average mastery in the subject, however, signifies that academic level of achievement in Science needs more attention.

Students' performance in National Achievement Test clearly indicates that majority of the learners have only average mastery in the subject which is quite far from the national standard. Several factors could explain to this result. The role of teacher in an inquiry-based classroom is quite different from that of a teacher in a conventional classroom. Instead of providing direct instruction to students, teachers help students generate their own content-related questions and guide the investigation that follows. Crawford [5] believed that teachers work in an inquiry-based classroom requires taking on myriad of roles-roles that demand a high level of expertise. It means a myriad of constantly changing teacher roles that demands more active and complex participation that suggested by the commonly used metaphor, teacher as facilitator. If teacher is the key element in an inquiry classroom, they must possess certain attitudes and skills to encourage students' success in an inquiry-based learning [6]. In the same way, Stephenson [2] also posited that inquiry requires significant intellectual investment on the part of teachers to design learning tasks that are connected to the disciplines, to students' lives and to the world, while focused toward clear and achievable learning targets. It requires that teachers see themselves as learners and researchers of both the subject they teach and their professional practice as a whole. It means to say that teachers are becoming more and more accountable for student academic achievement. Aside from the curriculum, other components, including teaching, the quality of textbooks, and assessment practices, are important factors that need to be considered if students' experiences with inquiry are to be fruitful and fulfilling [7]. Similarly, Gormally et al. [8] stressed that other impediments to inquiry implementation are the challenges faced by students as well as instructors in accepting their new roles as facilitators and active learners respectively. Adopting an inquiry-based teaching requires substantial investment not only in curriculum development but also in new training for instructors to facilitate the shift of instructional practices.

In a related study, Smith [1] found out an opposite result from this present study. It was affirmed that inquiry-based teaching enhances student engagement, academic achievement and higher order learning outcomes. Benefits can also accrue for teachers through the integration of teaching and research, increased enjoyment and interaction with students and the rewards gained from enhanced learning outcomes for students. Also, White et al. [9] attested that low-performing students who engaged in self-assessment developed in inquiry earned scores closer to those of high-achieving students. This implies positive result to students' academic development.

TABLE 1
DIFFERENCES ON THE OCCURRENCE OF NRM THEMES BETWEEN MATHEMATICS AND SCIENCE TEXTBOOKS

School	Mean	SD	MPS	Interpretation
1	31.56	12.21	52.50	Average Mastery
2	20.36	6.43	33.94	Low Mastery
3	39.75	4.91	66.25	Moving Towards Mastery
4	31.47	5.77	52.44	Average Mastery
5	29.79	9.84	49.65	Average Mastery
6	38.96	11.74	64.93	Average Mastery
7	35.15	5.82	58.58	Average Mastery
8	27.41	8.85	45.89	Average Mastery
9	25.12	3.10	41.87	Average Mastery
10	37.48	8.42	62.47	Average Mastery
11	32.18	8.12	53.63	Average Mastery
12	22.23	6.99	37.06	Average Mastery
13	35.87	9.81	59.78	Average Mastery
14	35.56	12.33	59.27	Average Mastery
15	38.37	8.61	63.95	Average Mastery
16	31.98	8.08	53.30	Average Mastery
17	21.89	6.28	36.48	Average Mastery
18	23.41	5.68	39.01	Average Mastery

4 CONCLUSION

The Students' performance in National Achievement Test (NAT) clearly indicates that majority of the learners have only average mastery in the subject which is quite far from the national standard. This signifies that science teachers need to work more in enriching learnings to Science students in public high schools. This is to improve the result of NAT in the future. In this study, inquiry-based Science teaching may not be as effective as expected. Innovative teaching methodologies, like inquiry-based teaching, should be assisted with enough trainings and learning resources for teachers to ensure productive outcomes like that of the result on NAT.

5 RECOMMENDATIONS

In the light of the findings of this study, the following recommendations are offered for consideration:

1. Exposing to hands-on training and seminars related to inquiry-based teaching is highly encouraged among Science teachers.
2. School administrators, teachers and stakeholders should work together in designing programs and related activities that will contribute to the improvement of NAT results in the future;
3. Teachers may utilize the inquiry-based approach as frequently as needed to improve the quality of instruction and increase the academic performance of the students. However, it does not imply that teachers may pursue a single approach to teaching Science; and
4. The study used only student's performance in NAT. In future studies, it is recommended to use the quarterly rating of students in determining student's performance in Science.

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