

# Public Secondary School Teachers' Utility of Inquiry - Based Approach in Teaching Science

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**Abstract**— Twenty first century teaching requires learning activities that is more engaging and interesting where students are encourage to formulate questions and relate these questions to everyday life. Inquiry –based teaching has the capability of addressing this thrust since it allows students to engage in investigations to satisfy curiosities - curiosities that are being fulfilled when individuals have constructed mental frameworks that adequately explain their experiences. In this study, the researcher investigated the extent of utility of inquiry-based teaching among science teachers in public secondary schools. The content of the instrument anchored on the PRIMAS project was carefully selected in order to fit in the actual teaching context. The data from the 18 public secondary schools in Biliran, Philippines was analyzed. Results showed that inquiry- based science teaching are “oftentimes” employed by the teachers. This suggests that teachers still need all the opportunities to learn how to use inquiry-based in teaching science. Technical assistance, relevant trainings and workshops in inquiry-based teaching are greatly encouraged.

**Keywords**— Innovative teaching, teaching strategies, inquiry-based, public secondary schools, Department of Education.

## I. INTRODUCTION

Learning in the twenty first century needs a teaching approach that connects content to skill. Teachers are expected to teach students concepts that has a direct impact and relevance in developing the fundamental life skills necessary in carrying out daily activities. This conception that requires a teaching and learning activities that is more engaging and interesting where students are encourage to formulate questions and relate these questions in their everyday life can be facilitated through inquiry-based teaching.

To achieve this thrust, the Department of Education [1] highlighted in the K to 12 science curriculum the learning domains that develop students to understand and apply global context whenever possible, perform scientific processes and skills, as well as develop and demonstrate scientific attitudes and values. It has provided the learners with competencies necessary in understanding how the society and the world operates with the vision of developing a knowledgeable and creative members of the society who are creative, innovative, can scientific knowledge in local setting as well as critically address various problems, and are good decision makers.

Accordingly, Vize [2] defined inquiry teaching principles as a method wherein the direction of learning is being maneuvered by students. That is why teaching is expected to be an open discussion to students about what, why, how and when they want to learn and what they want to discover as part of the learning process. Haury [3] also agreed that the teaching approach engages students in investigations to satisfy curiosities - curiosities that are being satisfied when individuals have constructed mental frameworks that adequately explain their experiences. Wells [4] also stated that inquiry-based teaching has been closely associated with other teaching methods such as problem solving, laboratory instruction, project-based learning, cooperative learning and discovery instruction.

However, Gormally et al. [5] mentioned that the way how students and teachers perceived their new roles being active learners and facilitators seemed to be coupled with

uncertainties, thus become an impediment to inquiry implementation. Science curriculum is believed to be inquiry-based, but the way how it is being utilized in science classes in the actual teaching context received far less attention, hence, this study was conducted. The extent of utility of inquiry-based among science teachers in public secondary schools during SY 2015-2016 was used as reference to this research.

## II. METHODOLOGY

### A. Research Design and Data Gathering Procedure

The descriptive design was used in the study. For the information of teachers' utility of inquiry-based teaching approach, the content of the questionnaire was carefully selected by the researcher in order to fit in the actual teaching context. It anchored on The PRIMAS Project: Promoting inquiry-based learning in mathematics and science education across Europe [6].

### B. Research Locale

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

### C. Data Scoring

To determine the utilization of inquiry-based approach, the following 5-likert scale and mean values were used.

Index	Range	Description/Interpretation
5	4.3-5.0	Always
4	3.5-4.2	Oftentimes
3	2.7-3.4	Sometimes
2	1.9-2.6	Rarely
1	1.0-1.8	Never

### D. Statistical Analysis of Data

Data in this study was analyzed using descriptive statistics such as weighted mean, and frequency.

### III. RESULTS AND DISCUSSION

#### A. Utility of Inquiry-Based Approach in Teaching Science

Utility of inquiry-based approach (IBA) refers to the extent of application and use of inquiry-based approach in teaching science classes. Presented in the Table is the combination of inquiry-based approach and traditional approach in teaching Science. To determine science teachers' extent of utility of inquiry approach, they were asked how often they employ the stated activities in teaching science.

As gleaned from the table, teachers ask the students "always" to relate what they are learning in science to their daily lives (4.28), present their work to the class (4.26), and choose which questions to do or which ideas to discuss (4.26). Most of the inquiry based teaching practices are "oftentimes" (3.63) employed by the teachers in science subjects. The result deduces that science teachers in Biliran Division have utilized already the inquiry approach in teaching science, however, its utilization was not maximized in science classes. Several factors could explain to this result. In inquiry-based teaching, teachers inspire students to engaged in authentic scientific investigation and challenged students to inquire on their own learning. Wells [4] described teacher as a leader, facilitator, partner, assistant, provoker, equipper, supporter and developer of activities. Knowing these roles could be a challenge even to the most experienced teacher. There is a need to know students' skill levels, learning styles, pre-existing knowledge and interest. This is a requirement for a teacher who want to use inquiry-based learning. In the same way, Jarett [7] also noted that inquiry can make significant demands on teachers' content knowledge. By including students in decision-making and encouraging them in asking question, debate and negotiation, a teacher must rely heavily on his expertise in the subject, knowledge of resources, and ability to think quickly. Similarly, Saad et al [8] stressed that if learning to teach inquiry is acknowledged as a complex process, then teachers need various opportunities to understand the implementation of inquiry instruction. Some common concern among educators new to inquiry is how to teach with an inquiry approach when there are so many curriculum expectations to address. Therefore, it is essential for educators to have deep knowledge and understanding of the big ideas of the curriculum. Young [9] likewise noted that even the best teachers, being in school with a strong focus on high-stakes testing or having a curriculum that does not support inquiry may negatively impact their ability to enact inquiry in the classroom. Nevertheless, Magnusson et al. [10] stressed that effective science teachers know how to best design and guide learning experiences, under particular conditions and constraints, to help diverse group of students develop scientific knowledge and an understanding of the scientific enterprise. Colburn [11] also pointed out that 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. Inquiry-based teaching in the classroom demands technical abilities and practical skill among teachers

TABLE 1. Utility of Inquiry-Based Approach in Teaching Science

A. In my lessons, students....	WM	Interpretation
1. explained the reason behind the idea.	3.91	Oftentimes
2. analyzed relationships using tables, charts, or graphs.	3.62	Oftentimes
3. worked on problems for which there is no immediately obvious method of solution.	3.31	Sometimes
4. used computers to solve exercises or problems.	2.62	Oftentimes
5. wrote explanations about what was observed and why it happened.	3.88	Oftentimes
6. put events or objects in order and give a reason for the organization.	3.61	Oftentimes
7. used scientific calculators to solve exercises or problems.	2.89	Sometimes
8. worked individually without assistance from the teacher	2.89	Sometimes
9. worked together as a class with the teacher teaching the whole class	3.94	Oftentimes
10. worked together as a class with students responding one another	3.88	Oftentimes
11. worked in pairs or small groups without assistance from the teacher.	3.36	Sometimes
12. worked in pairs or small groups with assistance from the teacher.	3.91	Oftentimes
13. watched me demonstrate an experiment or investigation.	3.84	Oftentimes
14. formulated hypotheses or predictions to be tested.	3.56	Oftentimes
15. designed or planned experiments or investigations.	3.12	Sometimes
16. conducted experiments or investigations on their own	3.25	Sometimes
17. worked together in small groups on experiments or investigations.	3.59	Oftentimes
18. wrote explanations about what was observed and why it happened.	3.81	Oftentimes
19. studied the impact of technology on society	3.91	Oftentimes
20. learned about the nature of science and inquiry	3.89	Oftentimes
21. related what they are learning in science to their daily lives.	4.28	Always
22. presented their work to the class.	4.26	Always
23. chose which questions to do or which ideas to discuss	4.26	Always
<b>Average Mean</b>	<b>3.63</b>	<b>Oftentimes</b>

### IV. CONCLUSION

The extent of teachers' utility of Inquiry-based approach in teaching science clearly indicates that science teachers oftentimes use inquiry-based teaching in their classes. They have not fully embraced the thrust of the science curriculum which is inquiry-based. This signifies that science teachers in public secondary schools need to keep pace to address the demand of the 21<sup>st</sup> century teaching and be able to cope up with the challenges of the 21<sup>st</sup> century learners.

### V. RECOMMENDATION

Based on the findings and conclusions of the study, the following recommendations are offered for consideration:

1. Continuing professional development should be encouraged among science teachers.
2. Organize workshops/trainings on Science content specially to non-major teachers who are teaching Science.
3. Provide technical assistance in practicing inquiry-based in the classroom.
4. Offer teachers all the opportunities to understand the implementation of inquiry-based instruction.

5. School administrators should encourage teachers to attend seminar-workshops on Innovative teaching strategies in the 21<sup>st</sup> century.

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