

# Context-Based Learning in Teaching Senior High School: Basis for Science Instructional Material Development

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**Abstract** – One of the challenges of context-based education is to promote quality education through students' participation in the teaching-learning process. The aim of this study is to determine the effectiveness of context-based learning method towards students' achievement on selected topics in Science. This study was applied to two groups of selected Senior High School students. The first group which served as the control group includes forty (40) students taught by the traditional method and the second group which consists of another forty (40) students served as the experimental group that was taught on context-based learning. A teacher-made test with sixty items was used as a means of collecting quantitative data. The test was given to both groups as pre-test and post-test. The mean-frequency and percentage distribution were compared to both groups after the administration of the test. The findings in the control group showed that there is a moderate increase in the performance of the students after the utilization of the traditional method of teaching. The experimental group showed that the students attained a high performance in terms of knowledge in waste management. They have already mastered the topic through the application of Context-based learning method. This occurs because of the diversity of learners in their learning style. However, the result of the t-test analysis showed that there is a significant difference between the context-based learning method and the traditional method on students' academic performance in Science.

**Keywords** – context-based learning method, students' achievement, traditional method

## INTRODUCTION

The society live in a period of very rapid growth in scientific knowledge, much of which is quickly

employed in the creation of new technology. Today science and technology is the greatest factor in changing the way the society lives. Science education plays a very important role in broadening students' world outlook. The science classes always discuss actual, concrete things and phenomena, which are a part of students' reality and even everyday life. One of the important tasks of education is making science more relevant to students, more easily learned and remembered, and more thoughtful of the actual application of science. It is suggested that students need to develop or increase skills in dealing with provocative issues as they prepare to partake in a democratic society.

Before the implementation of K-12, the Philippines is the only country in Southeast Asia with a ten-year program prior to entry to the universities and colleges. The continuous deterioration of the quality of education in the Philippines has encouraged the Department of Education to push for the implementation of the K-12 Curriculum. It aims to give the learners a chance to receive a quality education based on an enhanced and decongested curriculum that is internationally recognized and comparable. The success of the school and the students in terms of educational progress rests on the active awareness and leadership of the teacher in carrying out its programs.

In relation to this, the teacher has a role in improving meaningful learning and instruction. He should see what goes on in the classroom so he could find how students can learn commendably. He has to think of several techniques and strategies that will increase the performance of the students. During the learning process, it is not required for the student to focus more attention on static theoretical content regarding concepts and memorizing procedural method regarding

different topics. The present way of delivering the lesson to the students focus traditionally in content-based learning that consist of too much content that is usually difficult for students to undergo processes such as selection process, analogical process and organizational process. Through this type of learning, students will find it hard to understand merely concepts without their interaction with the environment.

Several approaches were developed to make scientific topics more understandable, interesting and relevant for students. A very popular and widely implemented attempt in this regard is context-based learning. It is in this manner that Context-Based Learning was incorporated towards the improvement of students' performance. Context-based learning approach gives students a significant degree of autonomy over the learning activity. Examples of active learning activities include small group discussions, group and individual problem-solving tasks, investigations and role-play exercises. The use of student-centred approaches stimulates interests and motivation. This approach involves students in learning that demands activating their thinking and metacognitive skills, motivates students to learn, and encourages them to be scientifically literate. These premises served as the bases for the objective of the study, to experimentally verify the effectiveness of context-based learning in teaching the Senior High School Students of Inarawan National High School as the basis for Science Instructional Material (SIM) Development.

### **Context-Based Learning as a Teaching Method**

Context-Based Learning method makes teaching science meaningful for students and contributes to overcoming deficiencies in education [1]. Furthermore, this model shows students how to use the skills acquired in the course of their education in practice, and encourages student engagement in the classroom. Context-based teaching changes the roles of students and teachers, placing student activity at the centre of the teaching process.

In like manner, Prins et. al. [2] created a framework which aims to support educational designers in transforming authentic science practices into contexts for learning. This activity-based instructional framework will serve as a cognitive tool to support the educational designer to fully understand while developing teaching materials and planning learning activities for students to conduct.

In a broad sense of the word, a context-based teaching method is defined as using concepts and process skills that are relevant to students in a real-life context. Beginning, embedding and connecting teaching contents with an interesting story are good ways of relating it to the context of real-life. A particular form of this is a story from newspaper articles [3]. Newspaper articles should be used in teaching because, on the one hand, they create real-life contexts, and on the other, journalists are experts for writing interesting and good stories.

Instructional approaches to Science concepts contribute to the negative perception of the students to the subject. Moreover, Reyes, Espana and Belecina [4] confirmed that in teaching especially chemistry subject is not enough to simply give facts, figures, theories, laws and other ideas in verbatim without representation of the image or application in the real-life situations. Teachers should integrate new teaching pedagogies through different hands-on activities connecting to the experiences of the learners. On the other hand, Espinosa, Monterola and Punzalan, [5] found out that students find some science concepts like chemistry too abstract and mathematical.

### **Context-Based Learning as Application to Science Subjects**

Science education research has shown that the learning of science is a hard task for most students. The abstract nature of science makes learning scientific concepts difficult for most students. Furthermore, the emphasis on theory and the lack of context, i.e. failure to connect science with everyday life and society, makes teaching science unpopular and difficult to understand [6].

To immediately respond in this situation, Avargil et.al. [7], highlighted the major goals of science education which are to develop students' scientific literacy and their higher order thinking skills, skills for lifelong education and communication. Scientific literacy includes knowledge, understanding and skills that young people need to develop, in order to think and act appropriately on scientific matters, which may affect their lives and the lives of other members of the local, national and global communities. However, at present, the most common teaching practice is classic lecture-based teaching. This model is characterized by the transmission of ready knowledge, where students are a passive factor of their own development [8]. Studies have shown that teaching and learning styles have been teacher-dominated and have not allowed

students to develop their own ideas. As a result, there are no satisfactory results in education [9].

Consequently, Holbrook [10], stated that learning scientific facts, concepts and natural phenomena in school should not be separated from the context in which they appear. Teaching should be based on the student's previous knowledge and the connection between the experience of students and concepts can help students better understand several concepts. The key to successful learning is to link the knowledge gained to something that is meaningful to students [11].

In connection with this, Wieringa et. al [12], emphasized that Context-Based teaching should enable the achievement of the major goals of science education, connecting science to everyday life and learning scientific concepts and processes through dealing with real-world problems.

This is parallel to the current study since it refers to the student-centred method of teaching and learning wherein it engages students in their own success and incorporates their skills and interests into the learning process through the interaction with the environment. Learners are given the chance to work on their own, learn how to analyze and understand some problems through interaction with the environment, and they will have their own in their learning.

Parallel to this, Bahtaji [13] concluded that context-based learning activates students processing in learning the lesson. This is in line with the assumption that, by designed context-based learning, learners may encourage to pursue studies in the field of science, thus relating student's real-life experience to the lesson enhance the learning process of the students.

The skills of the student in integrating real-life experience to the lesson were due to proper classification and organization of the topic during the instruction. Organizing terms and topic content during the instruction could help the students to easily understand the concept. Thus, it shows that additive source-text materials in context-based instruction significantly improve the academic performance of the students in Science concepts.

### **Context-Based Learning as to Learners' Standpoint**

Tarihi [14] found out that students in the experimental group emerged with a better understanding of biology than their peers in the control group. Attitude surveys and interviews found that students in the experimental group were more positive about the course than the students in the control group. They enjoyed the experience and found out that the

subject matter is interesting. They thought that the learning method was effective, especially in comparison to the more traditional. Moreover, Context-Based approach encourages group work and some additional skills such as discussion, problem-solving, individual researches, team working and self-directed learning skills.

In the study conducted by Obiedo & Jugar [15], they found out that the exclusive use of context in the lessons increases the motivation of the students to perform better. In the class, the teacher must also address the context and reality of the students which would allow them to extend their knowledge beyond the abstract and basic context found in textbook problems. Oftentimes, the context of this textbook problems are not only novel and irrelevant to the reality of the students, but it could also be inappropriate and incorrect. In the future, establishing a framework that will allow teachers to construct problems out of student's reality can be very helpful in improving the quality of teaching and assessment in problem-solving.

On the other hand, Kölbach and Sumfleth [16] implemented a research design quite similar to Fechner [17]. Balanced by prior knowledge, students were assigned to groups of either real-life (bathing lake) or non-real-life (student laboratory) contexts. The intervention took about 60–90 min on two subsequent days. Both groups learned with exemplary solutions. Pre-post-follow-up tests revealed significantly higher gains concerning situational interest for the real-life context group but no differences regarding knowledge gains. The context-based learning increases the enthusiasm and motivation of students in different science concepts through presenting scientific topics as daily issues. It emphasizes the creation of a need-to-know for the students understanding of science concepts. Students need to learn the scientific concepts in order to better understand the features of a context about the subject matter.

### **OBJECTIVES OF THE STUDY**

This study determined the effectiveness of context-based learning in teaching the Senior High School Students in one National High School in Oriental Mindoro. The specific goal of the research is to determine the performance of the students in Science through the use of Context-Based Learning method.

### **Research Methodology**

Experimental research was employed in the study. Purposive random sampling technique was used. It is a

non-probability sample that is selected based on the characteristics of the population. This type of sampling can be very useful in situations when there is need to reach a besieged sample quickly and where sampling for proportionality is not the main concern. In this study, twenty students each from Academic Track and TVL Track were chosen based on their corresponding transmuted grade as Very Satisfactory, Satisfactory and Fairly Satisfactory. This study was conducted in Inarawan National High School located at Inarawan, Naujan, Oriental Mindoro. It is one of the big schools in the Division of Oriental Mindoro with a total student of 806 from Grade 7 to Grade 12. It is headed by a Principal I with 41 teaching and non-teaching personnel. The respondents of the study were the selected Grade 11 students of Inarawan National High School taking up Academic Track and Technical Vocational Livelihood Track, both of which are classified as regular classes and whose Science subjects are handled by the current researcher.

### **Research Design**

The study used an experimental method of research. Experimental research design is the primary approach used to investigate causal relationships and to study the relationship between one to another. This is an experiment where the researcher manipulates one variable, and control/randomizes the rest of variables. It has a control group, the subjects have been randomly assigned between the groups and the researcher test one effect at a time. It can be understood to comprehend different causal processes through manipulation and controlled testing. This makes this design appropriate for this study since the student-respondents were grouped into two, the control group and experimental group, whose learning outcomes were compared based on modification and non-modification of treatment. The study was conducted based on the above-mentioned principles of experimental design with the administration of pre-test and post-test. It was used to test the hypothesis that the students in the experimental group through the application of Context-Based Learning method would gain more knowledge than the group exposed to Traditional teaching method.

### **Participants of the Study**

The respondents of the study were the selected Grade 11 students of a National High School in Oriental Mindoro taking up Academic Track and Technical Vocational Livelihood Track, both of which are classified as regular classes and whose Science

subjects are handled by the researcher. Selected Grade 11 students from the Technical Vocational Livelihood Track and Academic Track served as the control group and experimental group. Each group consists of 20 students from each track. From the Academic Track, out of 79 students, twenty (20) students (6 students whose transmuted grade is Very Satisfactory, 7-Satisfactory and 7-Fairly satisfactory) together with the students from the Technical Vocational Livelihood Track wherein out of 41 students, twenty (20) students (6 students whose transmuted grade is Very Satisfactory, 7-Satisfactory and 7-Fairly satisfactory) were chosen as sample and were taught using the Traditional Method of teaching. On the other hand, twenty (20) students from the Academic Track (6 students whose transmuted grade is Very Satisfactory, 7-Satisfactory and 7-Fairly satisfactory) together with the students from the Technical Vocational Livelihood Track wherein out of 41 students, twenty (20) students (6 students whose transmuted grade is Very Satisfactory, 7-Satisfactory and 7-Fairly satisfactory) were chosen as sample and were taught using Context-Based Learning method.

### **Research Instrument**

A teacher-made pre-test and post-test with sixty (60) items each was used as the main instrument of this study. Topics included in the questionnaires are Introduction to Waste Management System (Concept of Waste Management); 4R System (Reduce, Reuse, Recycle and Recover); Types of Wastes (Organic Waste, Solid Waste); and Innovative Solution (Health and Safety). These topics are intended for the third quarter period and the questions were constructed parallel to the science concepts and competencies during the conduct of the Context-Based Learning and Traditional Teaching methods among the Senior High School respondents. The research instrument was validated by the Science education experts, and was tested for reliability through the administration of the test instrument to ten non-respondent students in the same school. The scores were analyzed through Pearson's  $r$  product of moment correlation where the coefficient determined the reliability as a measure of the strength and direction of association existing between the tests.

### **Data Collection**

This study was conducted in a National High School located at Inarawan, Naujan, Oriental Mindoro. It is one of the big schools in the Division of Oriental

Mindoro with a total student of 806 from Grade 7 to Grade 12. It is headed by a Principal I with 41 teaching and non-teaching personnel. The respondents of the study were the selected Grade 11 students taking up Academic Track and Technical Vocational Livelihood Track, both of which are classified as regular classes and whose Science subjects are handled by the researcher. To generate the data, two different teaching methods such as Traditional Teaching Method and Context-Based Learning method were employed. Both the control and experimental groups were taught with the same Science concepts. The researcher gave pre-test to both groups. After the administration of pre-test, the control group was taught using the Traditional Teaching method where the researcher provided a lecture to the class. On the other hand, Context-based learning method was employed to the experimental group.

The traditional method was delivered where the students listen as the teacher talks and the students merely listen to the facts and theories given by the teacher. Here the teacher is considered active in the teaching-learning process and the students are passive since their focus is centred on the teacher. After the discussion, they will do the activities alone. On the other hand, the experimental method was done through exposure to the learning environment. Learners were presented with several concepts. They started on the process of observations from real-world context and relating them to several phenomena. Context-Based learning is a student-centred method to teaching and learning, utilizing scenarios to replicate the social and political context of the students working or potential working environment. After this, the students presented and discussed solutions to problems based on what they have learned.

### **Ethical Considerations**

The study ensured the ethical protocol in the conduct of the research. Communications prior to the conduct of the study was duly approved by the Division Superintendent for endorsement to the Principal of the school which served as the site of the study. The student participants were gathered where the researcher explained the research purpose thoroughly. The participants' consent and willingness to take part in the study were given utmost concern.

### **Data Analysis**

All the raw scores were collated and subjected to appropriate statistical analysis. The researcher

employed both descriptive and inferential statistics. Mean values of the pre-test and post-test results for both the control and experimental groups were computed to determine the students' learning outcomes. T-test at 0.05 level of significance was used to analyze the hypotheses of the study.

Data and result analyses were performed using frequency and percentage which focused on determining the pre-test and post-test results of the control and experimental groups. Paired T-test formula between two means was used to test the hypotheses of the study which deal on determining the significant difference in the test results of the control and experimental group.

## **RESULTS AND DISCUSSION**

**Table 1. Mean Performance of Pre-test and Post-test Scores in the Control and Experimental Group on Waste Management**

	<b>Pre-test</b>	<b>Post test</b>
Control Group	23.13	30.5
Experimental Group	24.13	48.3

The pre-test performance of the selected Senior High School students under the control group was described as low as presented by its mean score of 23.13 (Table 1). The findings imply that the student-respondents in the control group have limited knowledge about waste management. A simple attribution that could substantiate this result is that limited lecture was applied to the group when the pretest was administered. This was the result of their prior knowledge about the selected topics in Science. Hence, it can be implied that this group of students may tend to achieve a higher level of performance if there is the utilization of proper teaching method.

The inadequate knowledge of the students regarding waste management is supported by Tsaparlis et al. [6] who found out that the Science education research has shown that the learning of science is a hard task for most students. Furthermore, the emphasis on theory and the lack of context, i.e. failure to connect science with everyday life and society, makes teaching science unpopular and difficult to understand.

However, there is a mean of 30.50 describing a low performance of the control group during the post-test.

The result indicates that the user of the traditional method of teaching was able to increase the knowledge of the students on waste management. However, the percentage of students with low performance even after the concepts were taught needs to be addressed. This post-test result can further be attributed to the fact that

the overall performance of the students depends heavily on the instructional approach employed by the teacher in the classroom. It also emphasizes that teachers are contributory factors in the mean performance obtained using the Traditional method of teaching. Even though the increase is not that impressive, teachers play an essential role in the organization of learning for the students.

The findings conform to the investigation of Vos [18] who affirmed that traditional science courses have a strong focus on theoretical concepts, which have to be learned and memorized. These facts and theories are taught in a fixed and logical manner, an educational structure which was difficult to reform for a very long time. Several problems in secondary education were associated with this kind of courses, including a lack of transfer of these concepts to the daily life of students. This lack of relevance could cause a decrease in students' motivation, interest and attitude towards science. Similar to the distribution of the control group, the experimental group attained a performance of low during the pre-test with a mean score of 24.13.

The result signifies that before the employment of the Context-Based Learning method, Grade 11 students are not knowledgeable with the concepts and processes related to waste management. The low performance indicates the need to employ an effective teaching strategy to significantly improve the performance of the students.

The findings of this study were attributed with the fact that prior to the application of Context-Based Learning, students obtained scores that are similar to that of the control group. The same low scores obtained can be justified with the fact that the knowledge of the students remains the same unless there is an intervention done by the teacher. Ramos [19] concluded that teachers should be encouraged to explore and view other teaching strategies and find more ways to entice other students to challenge themselves to create their own strategies to use in the field and to become more global in perspective. With this, teachers must employ not only one teaching strategy that he can use in the teaching and learning process. He must be explorative to what other means can the teacher do so that students will be actively involved in the scenario, that is, student-centred learning should take place.

After the employment of Context-Based Learning in teaching the senior high School students in the experimental group, they obtained a high performance

in terms of knowledge in waste management with a mean score of 48.3. Interestingly, about 62.5% of the student-respondents in the said group perform very highly with scores ranging from 49-60. Meanwhile, about 22.5% have scores from 37-48 which translates to a high level of performance. Fifteen per cent of the students in the experimental group obtained an average performance or scores within 25-36 points.

It is evident that when the students are taught using the Context-Based learning, their average performance improved from being described as low to high. This indicates that the students tend to fully grasp the concept of waste management and be able to translate their learning in answering the questions correctly.

The result presented is supported by the findings of Stanisavljević [8] who found out that the application of context-based teaching directly contributed to the better quantity and quality of knowledge. Through context-based teaching, students connect the given content with everyday life. They can understand this content better and apply the knowledge acquired. Furthermore, they are able to assess the value of learning and connect it with the previously acquired knowledge, in order to build their own system of knowledge. In this way, they become aware of the bigger picture, and of the value and application of the concepts learned.

Shown in Table 2 are the results of the t-Test of the difference between the pre-test and post-test scores of the control group who were taught under the Traditional teaching method.

With the level of significance equal to 5%, there is a significant difference between the pre-test and post-test about waste management of student-respondents under the control group with computed t-value of 4.6095 that exceeded the critical value of 2.0227.

The result implies that the 7.37-point difference in the scores of the students during the pre-test and post-test is indeed an improvement in the Grade 11 students' performance on waste management when the traditional method of teaching was employed.

Analyzing further, it can be implied that the use of the traditional method of teaching can also be effective but other methods are more preferred to use since the mean difference of 7.37 is low.

The result is connected to the conclusion of Stanisavljević, in 2015 who underscored that at present, the most common teaching practice is the classic lecture-based teaching.

**Table 2. T-test Results on the Difference in the Performance in Pre-test and Post-test of the Control Group Taught Using Traditional Method**

	N	Mean	SD	Computed t-value	Critical t-value	Result
Pre-Test	40	23.13	1.14	4.6095	2.0227	Significant
Post-Test	40	30.5	1.36			

**Table 3. T-test Results on the Difference in the Performance in Pre-test and Post-test of the Experimental Group Taught Using Context-Based Learning**

	N	Mean	SD	Computed t-value	Critical t-value	Result
Pre-Test	40	24.13	1.04	18.1102	2.0227	Significant
Post-Test	40	30.5	1.11			

Exhibited in Table 3 are the results of the t-Test on paired samples regarding the difference between the pre-test and post-test scores of the Grade 11 students of Inarawan National High School belonging to an experimental group who were taught with Context-Based Learning.

As shown, there is a significant difference between the pre-test and post-test results of students under the experimental group as indicated by a higher test statistic of 18.1102 in comparison with the critical value of 2.0227.

The result of the post-test after the application of Context-Based Learning method is attributed to the fact that this method greatly enhances the performance of the students on selected topics in Science. It clearly shows that Context-Based learning is an effective method in improving students' performance.

The result shown in table 4 adapts the study conducted by Obiedo and Jugar (2017), who found out that the exclusive use of context in the lessons increases the motivation of the students to perform better.

As shown in table 4, the computed t-value of 0.6034 failed to exceed the critical value of 2.0227, thus, indicating that there is no significant difference in the mean pre-test scores of student-respondents between two teaching scenarios of traditional method and context-based learning.

The result of the pre-test can be considered as prior information about the students' level of understanding of waste management. It can be guided by Walan [20] who affirmed that teacher needs to move forward not only by doing but also knowing why they are doing the activities and how to do them. Student's experiences can contribute to this awareness among teachers and developing the teaching practice.

**Table 4. T-test Results on the Difference in the Performance in Pre-test of the Control and Experimental Group Taught Using Traditional Method of Teaching and Context- Based Learning**

Compared Groups	N	Mean	SD	Computed t-value	Critical t-value	Result
Control Group (Traditional Method of Teaching)	40	23.13	1.14	0.6034	2.0227	Not Significant
Experimental Group (Problem- Based Learning)	40	24.13	1.04			

**Table 5. T-test Results on the Difference in the Performance in Post-test of the Control and Experimental Group Taught Using Traditional Method of Teaching and Context- Based Learning**

Compared Groups	N	Mean	SD	Computed t-value	Critical t-value	Result
Control Group (Traditional Method of Teaching)	40	30.5	1.36	9.8850	2.0227	Significant
Experimental Group (Problem- Based Learning)	40	48.3	1.11			

From Table 5, it can be inferred that there is a significant difference in the post-test mean scores of student-respondents on waste management between the traditional method of teaching and context-based learning method as shown by the computed test statistic of 9.8850 exceeded significantly than the critical value of 2.0227 at 5% level of significance.

Given the result, it can be inferred that teaching waste management in a context-based learning environment is more effective than using the traditional teaching method in improving the students' level of performance.

The positive effect of good interaction between the teacher and students is greatly attributed to the high performance of the students in the post-test. The result proves that meaningful instructions could generate positive result if teachers are consistently facilitating the activities done by the students, specifically the Context-Based Learning method.

The result of the t-test analysis is hereby supported by several studies. These include the study of Cigdemoglu [21] who found out that Context-based Approach through 5E (engagement, exploration, explanation, elaboration, and evaluation) seems to be more effective than traditional instruction on students' understanding of chemical reactions and energy as well as the students' chemical literacy skills. Rather than traditional instruction, Context-Based Approach through 5E learning competencies may be used to increase students' interest and curiosity about chemistry learning.

The proposed Science Instructional Material (SIM) can be used in the instruction since the activities contained in the materials are context-based in order to greatly enhance students' performance and gain mastery of the subject in a more meaningful way.

## CONCLUSION AND RECOMMENDATIONS

The main objective of this study to determine the effectiveness of context-based learning in teaching the Senior High School students of Inarawan National High School. The context-based learning method is regarded as appropriate in achieving the main objective of this study. During the utilization of this method, it was found out that there is an increase in the performance in post-test of the control and experimental group on waste management as compared to the pre-test. The use of Traditional method of teaching and Context-Based Learning method among Senior High School students generated a positive result on the control and experimental group. This method has

increased the performance of the students in the post-test. The pre-test performance of the selected Senior High School students on waste management did not differ using Traditional Method of teaching and Context-based learning method. Students taught under Context-Based Learning method performed better in the post-test than the students taught under Traditional teaching method.

As a result of these findings, it may be recommended that teachers should consider the diversity of the learners and may still employ the Traditional method of teaching. This is evident in the positive effect of the performance of the students in the post-test, although the result was not that impressive. Teachers should also utilize the Context-Based Learning method for teaching Science concepts as well as providing students with activities that are context-based in order to greatly enhance students' learning and acquire the target competencies in a more meaningful way. It is also advised that teachers should use Context-based learning method of teaching so that students will learn through the actual, practical experience rather than just its mere theoretical parts and to have an active engagement of the learners with the material. However, similar studies concerning other topics in Science should be conducted to determine further effects of Context-based learning method in the students' performance.

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