

Development and Validation Of Enhancement Activities for Grade 7 Science

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Abstract

This study focused on the development and validation of the enhancement activities for grade 7 science. It was conducted at Morong National High School during the school year 2014-2015 with 50 students per section. Students were taken using stratified random sampling technique and fifteen science experts teaching science served as respondents to determine the acceptability of the developed enhancement activities.

The research work used experimental method. Pretest and posttest were utilized to assess the level of performance of the students' respondents. Descriptive method was also used to describe and evaluate the acceptability of the developed and validated enhancement activities using the adapted questionnaire checklist about clarity of instructions, design characteristics, aids to instruction and learning activities.

The study found out that the developed enhancement activities in science was very effective in teaching different learning areas like cells to organism, plant and animal cells and microscopy. The findings of the study revealed that the group exposed to the developed and validated enhancement activities in science has significantly increase their performance in all learning areas compared to the group which did not use the enhancement activity.

All of the mean scores of the control and experimental groups in posttest were higher than the pretest. The experimental group gained more knowledge and perform successful in the topics like cell to organism, plant and animal cell and microscopy after using the developed and validated enhancement activities for grade 7 science. The student in experimental group increased their performance by 68% as compared to the score of the students in the control group.

The developed and validated enhancement activities for grade 7 science was evaluated as very much acceptable instructional materials by science experts with respect to clarity of instruction, design characteristics, aids to instruction and learning activities

Keywords: Enhancement Activities; Grade Seven; Education; Science, Students Performance

Introduction

Students, as the future decision makers for the country, who have an understanding of the fundamental scientific concepts and their application will be capable of thoughtfully contributing to an increasingly complex technological society through informed decisions. This level of scientific understanding has been referred to as scientific literacy.

Most educators agree that science teaching and learning should move away from a system that promotes science primarily as recall of factual information and rote computation to one which emphasizes conceptual understanding and logical process skills. Support for such a reform has existed, to some extent, for much of science education's history. As the world becomes more technologically advanced, the need for science education programs that can meet the current societal demands grows. Harwell and Montgomery (2007).

The desire to improve science achievement through more effective instructional strategies and the increasing awareness in recent years of the teaching learning situation has directed a lot of attention to understanding how learners learn and how to help them learn concepts. It only shows that few students at the secondary school or college level have had any formal instruction in learning how to learn. The efforts in assisting the learner to learn have led to the development of metacognitive strategies to enhance meaningful learning.

Today one of the major focuses of the Philippines is educational reform. The competitive spirit of Filipino has wanting to have education system and students to be the best in the world. Since this is not currently the case, things are changing. No Child Left behind (NCLB) of the United States of America brought with it a focus on two standardized testing and a back-to-basics mentality. International Reading Association (2007).

In the Philippines, educational institutions are clamoring for quality and excellence to meet the challenge and demand in the global scenario. This is supported by the provision of the Executive Summary of the 2002 Basic Education Curriculum which states that:

“The ideal teaching learning process is interactive, and thus, the curriculum has been restructured to promote more reciprocal interaction between students and teachers, between students and themselves (collaborative learning), between students and instructional materials, between students and multimedia sources, and between teachers of different disciplines.”

The provision mandates that educational institution should train individuals who will be productive and constructive citizens of the country.

Williams and Gibson (2007) wrote about how, in an attempt to “change the way students learn,” educators are discovering that “incorporating the arts into education, not only engages kids to teach, but also catches kids who don’t respond to traditional forms of education”. This, however, is not the case in many schools throughout the country.

Since teachers are agents of change, they have the right to introduce new strategies and techniques in teaching to make learning easier and more enjoyable on the part of the students. They should be both equipped and adapt themselves to growing needs of learners. Quality education is the product of quality educators in the classroom with school plan prepared with necessary educational tools to teach. It is dependent upon the quality of instruction having high quality or alternative instructional materials being used on the learning process. This fact is what the study aims to accomplish too.

The result of the National Achievement Test in Science of Morong National High School for the school year 2012-2013 the mps was 34.63 while school year 2013-2014 got the mean 20.51 with the standard deviation of 5.97 and mps was 34.19. The result showed that the performance of the students from the school year 2012- 2013 to 2013-2014 decreased in -0.44. There is a need to inject new approach and strategy in the curriculum development so as to improve the performance of the students, since it is also an indication of the kind of education being offered in Morong National High School.

This study is centered toward the above cited information. The researcher finds that developing an enhancement material in teaching is the basis of this study, thus, the need for improving the materials that will be used in the conduct of learning process in Science is assumed to be very important in order to attain quality education in different fields of effort.

The raising of quality education for the Filipino learners and graduates and empowering them for lifelong learning requires attainment of functional literacy in different discipline. The educators who have a decade of experience in teaching know that there is insufficient instructional materials that perhaps contributed to the low performance of students in Science. The result of the National Achievement Test (NAT) in science strongly indicates that there is a need to double time in the instruction and look into the factors why performance of the students is affected.

Section 10 of Educational Act of 1982 points out the importance of Science and Technology and its relevance to national growth and development relative to the new curriculum of the Enhanced Basic Education K to 12 Program to wit:

“Science and Technology are essential for national development and progress. The state shall give priority to research and development invention, innovation and their utilization; and to science and technology education training and services”

This act upholds the right of each one to education to form life learning skills that will make them productive members of the society. Because of the provision stated, the researcher realized that it is necessary to develop enhancement activities considering the limited resources as articulated in the mandate wherein the teachers are expected to practice creativity and resourcefulness to produce innovative materials for use in classroom. Learning is best achieved if the student will be engaged physically, intellectually and internally. The Chinese Proverb I hear and I forget, I see and I remember, I do and I understand underscores the need for a hands-on approach to science teaching. Without this approach students must rely on memory and abstract thought, two methods which restrict learning in most students. By actually doing and experiencing science, students develop their critical thinking skills as well as discover scientific concepts. This self-discovery stays with students throughout their lifetime while memory fades.

Science is a dynamic cultural force in the world. Undeniably in the modern world today, no human activity can be adequately considered apart from the influence of science and technology. With the advent of the Internet, an infinite amount of information is at the fingertips of anyone willing and able to access it. However, much of this information goes unchecked. It is up to the consumer to discern innovative gadgets from overpriced gimmicks, impending catastrophes from propaganda, and well-founded theories from fictitious tales. A conceptual understanding of scientific concepts can be an invaluable asset to anyone trying to rationally sort through the never-ending deluge of information, advertising, campaigning, and scare tactics infiltrating nearly all forms of media.

Children and adults alike no longer have to go to the library or encyclopedia set to answer their curiosities in life. Now, many of them are just clicks away on their home computer. National Research Council (2008). People in the academe must be motivated enough to upgrade themselves with the new innovation in teaching in order to adopt with the growing needs of every student. They must provide a stimulating environment for them to develop varied interest and abilities in order to satisfy their needs, remembering in mind that learners are always been the center of any educative process. Without the learner, there is no need for the two components of the educative process such as learning process and the learning situation. Lardizabal (2000).

According to Butzin (2007), when the No Child Left Behind Act (NCLB), was passed in 2001, its goal was to “establish a set of basic academic standards that all students should achieve”. Having standards that all students and schools were required to meet was supposed to force poor performing schools to rise to the standards and equalize the educational playing field. This, however, has not been the case. With pressure on teachers to have students pass the tests, and fear of what will happen if they do not, many schools, especially poor 5 performing ones, are focusing only on tested subject areas. This does not provide students the well-rounded education they need.

But in the study conducted by the Organization for Economic Corporation and Development (OECD, 2013) Program for International Students Assessment covering three subjects, namely Science, Mathematics and Reading, the Philippines did not even make it within the 40 countries.

The dismal performance can be associated to different factors like inadequacy of instructional materials, insufficient trainings of teacher in science, inadequacy of funds and little focus on research and development.

These perspectives and representations are prevalent internationally because new curriculum K to 12 which is adopted in the Philippines tend to be well developed and thus are frequently exported. Within science, educators and intellectuals feel particularly entitled to suggest that there is one right way of teaching the curriculum finding support in perspectives ranging from universalism to scientism. The professional and educational spheres regard science as a monolithic culture. Nagle (2013).

The researcher agreed that the system of education here in the Philippines must focus on aspects that could uplift the quality of education. Emphasis must be towards determining which curriculum should be implemented.

In connection to this, the use of enrichment and enhancement instructional materials stimulates the physical, mental and social skills as well. They are helpful tools in facilitating the teaching-learning process, thus, facilitate effective learning. Students were set to focus as they used the material as it guides them through the enhancement activities in using the jigsaw puzzle, slide puzzle, interactive diagram, vocabulary games and brain games. Instructional materials should be carefully selected and prepared. It should ensure engagement of learners while using the materials.

The result of the latest National Achievement Test in Morong National High School for school year 2013-2014 revealed that the mean percentage scores in Filipino got 55.88, in Mathematics 37.81, English 51.05, Science and Technology 34.19, Araling Panlipunan 52.63 and Computer Technology got 43.27 with an overall average of 46.39. The school achievement test of Morong National High School Science 7 in the school year 2012-2013 revealed the mean percentage score got 41.34 and for the school year 2013-2014 the mean percentage score was 39.78. This is a manifestation that the learning competencies remained unmastered among learners.

In relation to what is stated above, the researcher witnessed that for the past two years under K to 12 programs, the Science school achievement test given to the Grade 7 students where the study was conducted. It was interpreted as very poor or unmastered. The researcher observed that there was a disinterest on science instruction based on the result of the test given to the students and their performance on the subject. There were students who did badly in the subject. It could be due to the lack of instructional material or poor facilities that the students cannot cope with the challenges given to them in the given subject. With this, the researcher respectfully tried to help the performance of the students.

The researcher is looking for effective enhancement activities and instructional materials that will improve the teaching of science. The researcher wants to learn how to draw the interest and enthusiasm of the diverse groups of learners that the teachers have in classroom to enhance in wide range of learning. To do this, the researcher is encouraged to develop and prepare enhancement activities with diverse student populations and to discover strategies that are compatible with gender and racial equity so that each student has opportunities to learn and grow to his or her full potential. The enhancement activities that the researcher draw and build from this research will help to make science an interesting, approachable and fun subject in classroom.

Hence, the study was conceived with the aim of developing enhancement activities that allow the learners to learn experientially the difficult lessons as they practice the material using their senses such as jigsaw puzzles, slide puzzles, interactive diagram, vocabulary games and brain games. The enhancement activities serve as intervention materials to bridge and concretize concepts in Grade 7 Science.

Research Questions

This paper addresses the following questions:

1. What is the level of performance of the control group and the experimental group as revealed by the pretest and posttest with respect to lessons in;
 - 1.1 Cells to Organism;
 - 1.2 Plant and Animal Cells; and
 - 1.3 Microscopy?
2. Is there any significant difference on the performance of control group and experimental group as revealed by the pretest and posttest scores?
3. Is there a significant difference on the level of performance of the control and experimental groups as revealed by their mean posttest scores?
4. How effective is the developed and validated enhancement activities in teaching selected topics in Grade 7 Science?
5. What is the level of acceptability of the developed and validated enhancement activities for Grade 7 Science students in terms of:
 - 5.1 Clarity of Instructions;
 - 5.2 Design Characteristics;
 - 5.3 Aids to Instruction; and
 - 5.4 Learning Activities?

Methodology

A. Research Design/Method

The study utilized the experimental and descriptive methods of research. In experimental method of research, the one-group pretest and posttest design (quasi matched group design) were adopted. The test items were based on the previous School Achievement Test that was administered during the pretest and posttest. At the same time, one group of the student respondents was considered from the beginning until the end of the study. Hence, it was also call one shot experimental method. It is described to be a controlled process wherein the acceptability of the enhancement activities in learning was validated through the result of the pretest and posttest. On the other hand, this study also employed the descriptive method; a rubric questionnaire checklist was used to determine the acceptability level. The perception of the respondents was taken into account as their answer was gathered and tallied in reference to clarity of instructions, design characteristics, aids to instruction and learning activities of the enhancement activities.

Calmorin (1994), defined experimental research as a method or procedure involving the control or manipulation of condition for the purpose of studying the relative effect of various treatments applied to members of a sample, or the treatment applied to members of different samples. Two groups were involved in this study, the control group and experimental group.

This method was congruent to the study since it used pretest and posttest scores of the respondents to determine the level of performance upon exposure to the developed enhancement activities. Likewise, in order to recognize the acceptability of the developed enhancement activities, descriptive method was devised. The purpose of descriptive method of research is to find the truth that may have many different forms such as increased quantity of knowledge and to level up the factors of understanding in operating more accurately in formulations of the problem to be solved and many others. According to Teano (2007), descriptive method is used to discover facts on which judgement could be based. It describes records, analyses and interprets what it is.

This method is a help and appropriate in the pursuit of the study, since this gave insights and perceptions of the respondents on the developed enhancement activities with respect to several aspects considered in the study.

B. Participants/Sampling

The primary subject of this study was the developed enhancement activities, since the researcher used an instructional material such as jigsaw puzzles, slide puzzle, interactive diagram, vocabulary games and brain games for the improvement of learning of the students in Morong National High School.

The secondary subjects of this study were the students of Morong National High School with a total population of 779 Grade 7 students. The respondents were two selected sections of the Grade 7 students, Grade 7 Kindness and Grade 7 Honesty having 50 students per class that were chosen through stratified sampling technique. Stratified sampling is a probability sampling technique wherein the researcher divides the entire population into different subgroups or strata, and then randomly selects the final subjects proportionally from the different strata. Exportable, (2013)

In the conduct of the study, all the students were given pretest before they were exposed to the

enhancement activities in Grade 7 Science and then the posttest. The topics include Cells to Organisms, Plant and Animal Cells and Microscopy as parts of the lesson. The stratification was used by the researcher for the reason that stratified sample will always achieve greater precision, provided that the strata have been chosen so that members of the same stratum are as similar as possible in terms of the characteristic of interest. The greater the differences between the strata, the greater the gain in precision. This technique is useful because it ensures the presence of the key subgroup within the sample. And with stratified sampling, the researcher can representatively sample even the smallest and most distant subgroups in the population. The student respondents were selected based on their grades during the first quarter. The researcher classified them to low (75-79) developing, average (80-85) approaching proficiency or high (86-90) proficiency and hearing impaired (HI) in academic performance. The researcher classified the respondents based on the percentile rank wherein it is a measure used in statistics indicating the value below which a given percentage of observations in a group of observations fall.

The experts who were the faculty respondents specifically the science teachers of Morong National High School and secondary schools of Morong District also evaluated the enhancement activities for Grade 7 Science. The experts evaluated the enhancement activities to prove their acceptability and rated using the questionnaire checklist.

C. Collection of Data

In this study, the researcher gathered pertinent data from the result of the pretest and posttest scores of the respondents and from the perceptions of the respondents using the rubric as adopted questionnaire checklist to determine the acceptability of the enhancement activities.

The test items were based on the learning competencies mandated by the Department of Education, the Philippine Secondary School Learning Competencies in K to 12 Enhanced Basic Education Curriculum. The test was based from the test items in the previous School Achievement Test.

The required learning competencies were as follows: identify parts of the microscope and their functions; differentiate organ systems, organs, tissues, cells from each other; differentiate plant and animal cells according to presence or absence of certain organelles; describe the structures of microorganisms using a microscope; identify beneficial and harmful microorganisms; explain why the cell is considered the basic structural and functional unit of all organisms; identify parts of the microscope and their basic functions.

The questionnaire checklist was adapted from the questionnaire of Dela Cruz (2013), since it was parallel to the study. Slight modifications and revisions were made and an expert, a Master Teacher in Science from Morong National High School validated it again.

With regard to the acceptability of the enhancement activities, the rubric questionnaire-checklist was used. The variables are the clarity of instructions, design characteristics, aids to instruction and learning activities.

The following scale and verbal interpretation were used in the evaluation of the level of acceptability in different variables

Scale Range	Verbal Interpretation
5 4.20 – 5.00	Very Much Acceptable (VMA)
4 3.40 – 4.19	Acceptable (A)
3 2.60 – 3.39	Moderately Acceptable (MA)
2 1.80 – 2.59	Undecided (U)
1 1.00 – 1.70	Not Acceptable (NA)

It is composed of questions and statements which refer to the extent and acceptability of the developed enhancement activities using the 5 variables. They were answered by the respondents to test the effectiveness and acceptability of the enhancement activities.

D. Data Analysis

In order to systematically interpret the data gathered, the following statistical tools were used: To determine the level of performance of the experimental and control groups as revealed by the pretest and posttest with respect to Cells to Organism, Plants and Animal Cells and Microscopy mean and standard deviation were used.

To determine the significant difference on the level of performance of the experimental and control groups as revealed by the pretest and posttest scores, dependent t-test was used.

To determine the significant difference on the level of performance of the control and experimental groups as revealed by their mean posttest scores, independent t-test was used.

To determine the effectiveness of the enhancement activities in teaching selected topics in Grade 7 Science mean gain was used.

To determine the acceptability of the developed and validated enhancement activities in selected topics in Grade 7 Science with respect to clarity of instructions, design characteristics, aids to instruction and learning activities weighted mean was used.

E. Ethical Issues

In response to written requests, consent was obtained from the principals and the participating teachers of the schools to conduct the study there. Data collection occurred in a stress-free environment, where the self-esteem of the teachers and learners were nurtured. It was stressed that all participants would remain anonymous and that the information gathered would remain confidential and would only be used for research purposes.

Result and Discussions

This section presents the discussion and the statistical findings, analysis and interpretation and general discussions.

The Level of Performance in Science 7 of the Experimental and Control Groups Before and After Exposure to Enhancement Activities in Science as Revealed by the Pretest and Posttest with Respect to Cells to Organisms, Plans and Animal Cells and Microscopy.

Table 1 shows, the mean and standard deviation on the level of performance of the experimental and control groups as revealed by their pretest and posttest in selected topics in science 7.

Learning Areas		Experimental Group			Control Group		
		Mean	sd	VI	Mean	sd	VI
Cells to Organisms	Pretest	8.55	3.41	D	9.80	2.42	AP
	Posttest	12.15	3.84	P	10.15	3.56	AP
Plant and Animal Cells	Pretest	8.00	4.54	B	9.50	3.30	D
	Posttest	15.70	4.64	P	11.80	4.64	D
Microscopy	Pretest	10.05	2.31	AP	8.60	2.19	D
	Posttest	14.65	3.33	A	9.70	2.85	AP

Table 1

Mean and Standard Deviation on the Level of the Performance of the Experimental and Control Groups as Revealed by their Pretest and Posttest Results in Selected Topics in Science 7

The table shows the sample means and standard deviations on the level of performance of the experimental and control groups as revealed by the pretest and posttest scores with respect to different lessons. As shown in the table, from pretest results the experimental group's level of performance is "developing" with respect to the obtained results of computed mean and standard deviation as revealed by their pretest in Cells to Organisms which are 8.55 and 3.41 respectively while the control group's level of performance is "approaching proficiency" with a computed mean and standard deviation of 9.80 and 2.42. Regarding the topic Plant and Animal Cells experimental group gained a mean of 8.00 and standard deviation of 4.54 which is verbally interpreted as "beginning" while the control group has a computed mean of 9.50 and standard deviation of 3.30 verbally interpreted as "developing". In Microscopy the level of performance of the experimental group is "approaching proficiency" with 10.05 and 2.31 computed mean and standard deviation respectively while for the control group the obtained mean is 8.60 and standard deviation of 2.19 verbally interpreted as "developing".

The level of performance of the students after the exposure to the Enhancement Activities in Science 7 (experimental group) and after a traditional method teaching (control group), their posttest revealed that it reached the status of "advanced" and "approaching proficiency" performance. In Cells to Organisms the computed mean and standard deviation of the experimental group is 12.15 and 3.84 correspondingly which

represented as “proficient” while the control group has a mean of 10.15 with a standard deviation of 3.56 and verbally interpreted as “approaching proficiency”. In Plant and Animal Cells the experimental group has a computed mean and standard deviation of 15.70 and 4.64 respectively with “proficient” performance while the control group attained a “developing” verbal interpretation with a mean of 11.80 and standard deviation of 4.64. In terms of Microscopy the computed mean of 10.05 and standard deviation of 2.31 were obtained with verbal interpretation of “advanced” for the experimental group and “approaching proficiency” performance was interpreted in the control group which obtained the mean of 9.70 and 2.85 for standard deviation.

With regard to the pretest and posttest of both groups of respondents upon evaluating the table, it showed an impression of parallelism with their performance regarding to the standard deviation as shown in the table likewise the posttest shows a “proficient” performance for the experimental group and “approaching proficiency” performance for the control group with respect to the learning areas namely Cells to Organism, Plant and Animal Cells and Microscopy.

The above result is supported and correlated to the study of Ibay (2012) that the pretest and posttest were administered to determine the workability and effects of Filipino-Based Instructional Materials. The pretest serves as the basis of determining the weakness of the students with regard to the learning areas and contribute to the performance of the students while posttest is the end-line basis to determine what has been attained/gained. It only affirms that the exposed respondents (experimental group) to enhancement activities made a difference on the level of performance compared to the unexposed respondents (control group). The experimental group performed better than the control group. Although the control group also learned from the traditional method of teaching which could be gleaned on the table.

Significant Difference on the Level of Performance of the Respondents in the Experimental Group and Control Group as Revealed by the Pretest and Posttest Scores with Respect to Different Learning Areas.

Table 2 shows the t-test results on the significant difference on the experimental group in their performance with respect to different learning areas

Experimental Group		Mean	Sd	T	df	Sig	Ho	VI
Cells to Organism	Pretest	8.55	3.41	4.20 3	19	.000	R	S
	Posttest	12.15	3.84					
Plant and Animal Cells	Pretest	8.00	4.54	7.34 0	19	.000	R	S
	Posttest	15.70	4.64					
Microscopy	Pretest	10.05	2.31	5.75 5	19	.000	R	S
	Posttest	14.65	3.33					

Table 2
t-Test Result on the Significant Difference on the Performance of the Respondents in the Experimental Group as Revealed in the Pretest and Posttest Results with Respect to Different Learning Areas

Statistically, it was found out that there is a significant difference on the performance of the respondents in the experimental group as revealed in the pretest and posttest results with respect to Cells to Organism, Plant and Animal Cells and Microscopy since the obtained p-value of 0.00 does not exceed at 0.05 level of significance, thus the null hypothesis is rejected.

Performance scores of the pretest and posttest demonstrated the significant difference. This suggests that the exposure to the developed enhancement activities for Grade 7 Science generated significant gains. The result implies that the instructional material is an important aid in teaching Science. It accounts in acquiring knowledge and it provides the good results among the students with regard to their performance. The different lessons taught in the experimental group with the use of enhancement activities increase the performance of the respondents as revealed by the pretest and posttest result with respect to the different lessons in science 7. The findings were supported by the study of San Juan (2007), “Development and Validation of Computer Aided Modules in Advanced Biology for High School Students” wherein she made use of pretest and posttest to determine the significant difference on the level of performance of her respondents.

Likewise, the study of Jimenez (2008), entitled “Development and Validation of Laboratory Manual

in General Chemistry” stated that the students performed better with laboratory manual as revealed in their pretest and posttest scores.

The cited studies are similar to the present study since it also assessed and evaluated the level of performance of the students by means of pretest and posttest. It also dealt with the enhancement activities as well as both studies wanted to determine the effectiveness of the developed instructional materials.

Table 3 presents the t-test results on the significant difference on the performance of the respondents in the control group as revealed in the pretest and posttest results with respect to different learning areas.

Control Group		Mean	Sd	T	df	Sig	H _o	VI
Cells to Organism	Pretest	9.80	2.42	.457	19	.653	A	NS
	Posttest	10.15	3.56					
Plant and Animal Cells	Pretest	9.50	3.30	1.951	19	.066	A	NS
	Posttest	11.80	4.64					
Microscopy	Pretest	8.60	2.19	1.636	19	.118	A	NS
	Posttest	9.70	2.85					

Table 3

t-Test Result on the Significant Difference on the Performance of the Respondents in the Control Group as Revealed in the Pretest and Posttest Results with Respect to Different Learning Areas

The table shows sufficient evidence to claim that there is no significant increase on the performance of the control group as shown by the pretest and posttest scores.

There is considerable evidence to accept the null hypothesis in the study comparing the mean performance of the group before and after the conduct of the experiment since the computed P-values are all greater than the alpha level of 0.05.

According to the findings of Ramos (2011), which is entitled “Level of Efficacy and Performance of the Teaching Staff of Morong National High School: Basis for Faculty Development Program” the level of efficacy of MNHS Teachers Performance is outstanding. She recommended that the school administrators should enhance the faculty development program considering effective classroom management, recent trends in teaching and learning for students.

The above mentioned facts are supported by the study of Marino (2005) which reveals that when two groups were already established and the mean and the standard deviation of the pretest scores of both groups were compared in order to prove the difference in the performance between control and experimental group, the performance of the control group in the pretest and posttest did not differ significantly in the different learning areas and it was verified that control group performed less compared to the experimental group.

Performance scores of the control group on pretest shows a high schema among respondents and for the posttest it demonstrated that the performance of the students were at the same level with the pretest using traditional way of teaching so a teacher can employ several teaching strategies to make instruction more effective. The performance of the control group reflects the environment, personal problem of the students, role of teacher and the module in the learning process or situation.

Significant Difference on the Level of Performance of the Respondents in the Experimental Group and Control Group as Revealed by the Posttest Scores with Respect to Different Learning Areas.

Table 4 presents the t-test result on the significant difference on the performance level of the respondents in the experimental and control groups as revealed in the posttest with respect to different learning areas.

Posttest	Mean	Sd	t	df	Sig	Ho	VI
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Cells to Organism	Experimental	12.1500	3.84263	1.708	38	.096	A	NS
	Control	10.1500	3.55816					
Plant and Animal Cells	Experimental	15.7000	4.63511	2.659	38	.011	R	S
	Control	11.8000	4.64078					
Microscopy	Experimental	14.6500	3.32890	5.052	38	.000	R	S
	Control	9.7000	2.84882					

Table 4
t-Test Result on the Significant Difference on the Performance of the Respondents in the Control and Experimental Group as Revealed in the Posttest Results with Respect to Different Learning Areas

It can be observed from the table that statistically there is a significant difference on the performance of the respondents in the experimental and control groups in terms of Plant and Animal Cells and Microscopy since the obtained p-value of 0.011 and 0.000 does not exceed at 0.05 level of significant difference thus, the null hypothesis is rejected. In Cells to Organism since the obtained p-value is 0.096 exceeded at 0.05 level of significance, thus, the null hypothesis is accepted.

The findings show that the respondents in the experimental group get the higher results than the respondents in the control group, which reveals that the use of the developed enhancement activities uplifted the performance of the Grade 7 students. In general, there is a significant difference on the performance of the experimental and control groups. This means that the performance of the students exposed to the Enhancement Activities for Grade 7 Science significantly improved in all learning areas.

This is similar to the work of Flores (2005), which revealed that the performance of the respondents before and after exposure to her module Reading Materials in Filipino has positive mean difference; thus, showed significant difference on the respondent's performance.

The present study is similar to the study conducted by Teano (2007), since the main purpose was to find out the effectiveness of an instructional design in enhancing the academic competence and confidence of students and it was found out that the experimental group performed better than control group with respect to different learning areas although control group also learned in traditional method of teaching as shown in the table.

The Level of Effectiveness on the Developed and Validated Enhancement Activities in Grade 7 Science with Respect to Different Learning Areas.

Table 5 below shows the level of effectiveness of the Enhancement Activities in Science 7 as evaluated by the experts and students.

Learning Areas	Mean Gain	Gain Relative Percentage	Verbal Interpretation
Cell to Organisms	1.97	64	Effective
Plant and Animal Cells	5.00	71	Effective
Microscopy	2.85	69	Effective

Table 5
Computed Mean Gain on the Level of Effectiveness on the Developed and Validated Enhancement Activities in Teaching Selected Topics in Grade 7 Science

The table shows that in Cells to Organism the students achieve the 64% mastery level. In Plant and Animal Cells students get the 71% mastery level while in Microscopy the students attain the 69% mastery level; therefore, the developed enhancement activities for Grade 7 Science are effective in enhancing and retention of the comprehension and critical thinking of the respondents.

The result is the same in the study of Bonifacio (2006), when he found out the effectiveness of computers in problem solving in mathematics; he found using computers to be an ideal method of teaching. Computers helped students to “use their mathematical knowledge and stimulate them into making thinking visible; thus, it is concluded that the use of computer is effective in teaching”.

Biology Education Research as cited by Singer et.al (2013) focused on identifying students’ conceptual understanding, developing concept inventories that measure students’ understanding of a given concept, and studying the effectiveness of different types of instructional approaches that promote greater students engagement.

It can also be noted that the student’ retention on the selected topics with the use of enhancement activities from experimental got higher performance compared to the control group. This implies that developed enhancement activities for Grade 7 Science provides different tasks which enable the students to understand the lesson. It shows that the enhancement activities are useful in understanding different terminologies needed by the students to supplement and reinforce transfer of learning.

The Level of Acceptability of the Enhancement Activities in Science 7 as Evaluated by the Experts with Respect to Clarity of Instructions, Design Characteristics, Aids to Instruction and Learning Activities.

Table 6 shows the level of acceptability of the Enhancement Activities in Science 7 as evaluated by the experts with respect to Clarity of instructions, Design Characteristics, Aids to Instruction and Learning Activities.

Criteria	Mean	VI
Clarity of Instructions	4.48	VMA
Design Characteristics	4.63	VMA
Aids to Instruction	4.64	VMA
Learning Activities	4.59	VMA
Overall	4.58	VMA

Table 6
Composite Table on the Level of Acceptability of the Developed and Validated Enhancement Activities as Perceived by the Teacher-Respondents with Respect to Different Criteria

The statistical data reveal that the developed enhancement activities in Science 7 as evaluated by science experts were very much accepted with respect to Clarity of Instructions which obtained a calculated mean result of 4.48. With respect to the Design Characteristics the developed enhancement activities as perceived by science experts were very much accepted with a mean score of 4.63. In terms of Aids to Instruction, the expert respondents evaluated the enhancement activities as very much accepted with a mean score of 4.64. With respect to Learning Activities, weighted mean of 4.59 was obtained which is verbally interpreted as very much accepted

The level of acceptability of the developed enhancement activities in terms of clarity of instructions, design characteristics, aids to instruction and learning activities as perceived by the teacher – respondents is very much accepted and this explains that the developed enhancement activities are deemed helpful.

The result implies that the said enhancement activities can be effective in classes. It should carry over the characteristics that would really help the users in the improvement of the teaching learning process. The study confirms the finding of the study of Perez (2007), that organization and presentation of the lessons evaluated by the students and instructors are very much accepted. Moreover, there was no significant difference in the evaluation of the two groups of respondents with respect to mentioned criteria. Also, Berdan (2008), found out that the evaluation of the students and instructors have the same evaluation on language and style of the different concepts of the developed material. The above-mentioned studies are all relevant to the present study since all dealt in providing instructional materials which are relevant, well presented and organized, language is clear, effective and useful that will somehow help the students in studying Science

Summary of Findings

Based on the analysis and interpretation of data, the following findings were drawn.

1. The Level of Performance in Science 7 of the Experimental and Control Groups Before and After Exposure to Enhancement Activities in Science as Revealed by the Pretest and Posttest with Respect to Cells to Organisms, Plants and Animal Cells and Microscopy. All mean score in the posttest of experimental and control groups were higher than that of the pretest. The experimental group gained knowledge and skills in different learning areas after being exposed to the developed enhancement activities in Grade 7 Science.

2. Significant Difference on the Level of Performance of the Respondents in the Experimental Group and Control Group as Revealed by the Pretest and Posttest Scores with Respect to Different Learning Areas. There is significant difference in the performance of the respondents in the experimental and control groups, as shown in the pretest and posttest results with respect to different learning areas.

3. Significant Difference on the Level of Performance of the Respondents in the Experimental Group and Control Group as Revealed by the Posttest Scores with Respect to Different Learning Areas. There is a significant difference on the performance of the respondents in the experimental and control groups in the posttest results with respect to different learning areas.

4. On the Level of Effectiveness on the Developed and Validated Enhancement Activities in Grade 7 Science with Respect to Different Areas. With respect to the level of effectiveness, the result implied that the developed enhancement activities for Grade 7 Science were found effective for the topics Cell to Organism, Plant and Animal Cells and Microscopy.

5. On the Level of Acceptability of the Enhancement Activities in Science 7 as evaluated by the Experts with Respect to Clarity of Instructions, Design Characteristics, Aids to Instruction and Learning Activities. The Developed Enhancement Activities for Grade 7 Science as perceived by the teacher-respondents was very much accepted with respect to different criteria.

Conclusions

Conclusions

From the summary of findings, the following conclusions were drawn:

1. The developed Enhancement Activities for Grade 7 Science contributed a lot after the utilization of the enhancement activities and there is a marked improvement in their performance and making inferences as revealed in the posttest results.

2. The developed Enhancement Activities for Grade 7 Science, showed significant difference on the performance of the experimental and control groups as revealed in the posttest result in terms of lessons Cells to Organisms, Plant and Animal Cells and Microscopy.

3. The developed Enhancement Activities for Grade 7 Science in very effective instructional materials in teaching Science.

4. The developed Enhancement Activities for Grade 7 Science as perceived by the teacher/experts' respondents on the level of acceptability was very much accepted.

5. The Enhancement Activities for Grade 7 Science serves as valuable tool for self-learning activities that could improve knowledge and deepen the mastery of the students in the lessons, thus increasing their academic performance in Science 7.

Recommendations

In the light of the said findings and conclusions, the following are the recommendation:

1. The developed Enhancement Activities in Science 7 can be used to improve the retention and mastery of the lesson of the Grade 7 students.

2. Test the effectiveness of the developed Enhancement Activities for Grade 7 Science to the fast learners and other type of students identical to multiple intelligence.

3. Constant modification and revision on the developed enhancement activities may be done to conform to the learning abilities, style and habits of the students.

4. Encourage Science teacher to develop an instructional material in their respective fields in order to provide and promote effective teaching-learning process.

5. The students may be exposed to more Science and Technology Activities for better opportunities of gaining knowledge and developing appreciation of the subject.

6. A parallel study may be conducted in other fields such as Mathematics, Filipino, Araling Panlipunan and others to improve the level of performance of the learners

References

- Alfarez, Cristina C. "The level of Acceptability of Constructed Instructional Materials in Teaching Light Waves" Unpublished Masters' Thesis, URS Morong, 2004.
- Andres, Marinel G., "Development Validation, Acceptability of Special Modules in Chemistry for Remedial Program" Unpublished Masters' Thesis, URS Morong, 2008.
- Aparejo, Aldrich G. et.al., "Teaching Approach Perceived Parental Involvement and Anatomy as Predictors of Achievement" Unpublished Masters' Thesis, Dela Salle University of Manila, 2009. Berdan,
- Alejandro D. "Development, Validation and Effectiveness of Modules in Ecology for College Students: Unpublished Masters' Thesis, URS Morong, 2008.
- Blanco, Shiela M., "development and Validation of Modules oof Selected topics in Biology: Unpublished Masters' Thesis, URS Morong, 2005.
- Buazon, Priscilliano T. Hand Book in Legal Basis of Education. Mandaluyong City: National Book Store. 2006.
- Butzin, Simone M. "Using instructional technology in transformed learning environments: An evaluation of Project Child" Unpublished Master's Thesis, University of California 2007.
- Calmorin, Laurentin P. Educational Research Management and Evaluation, 2nd Edition Manila: National Bookstore, Inc., 1994.
- Camarao, Elmer C. "Cognitive and Attitudinal Effects of Cooperative Learning in College Physics Teaching" Unpublished Master's Thesis, Tuguegarao 2008.
- Campo Jubette F. "Development Validation and Acceptability of Multi-Media Module in Music" Unpublished Master's Thesis, URS Morong, 2013.
- Ceballo, Genalin V. "The Effects of Motivation on Task persistence and Performance Attainment of Fourth Year High School Students" Unpublished Master's Thesis, URS Morong, 2006.
- David, Lyndel R., "Development and Validated Enhancement Activities in Optics" Unpublished Masters' Thesis, URS Morong, 2009.
- Doblada, Vivencio M. Jr. "The Effect of Enrichment Activities in the Performance of Fourth Year High School Students in Trigonometry" Unpublished Master's Thesis, URS Morong, 2007. Freiberg and Driscoll Universal Teaching Strategy. Allyn and Bacon A. Simon and Schuster Company. 1996
- Harwell, Sarah H. and Montgomery Sheltyn C., "Technology integration and the classroom learning environment: Research for Action" Unpublished Master's Thesis, University of Sto. Tomas. Ibay,
- Michelle A. "Development and Validation of Filipino-Based Instructional Materials in Advanced Algebra" Unpublished Master's Thesis, URS Morong 2012.
- International Reading Association (2013). Biology Education Research: Lesson and Future Direction. CBE Life and Sciences Education, 12 January 2013.
- Jimenez, Melinda S. "Development and Validation of Laboratory Manual in General Chemistry". Unpublished Master's Thesis, URS Morong, 2008.
- Lardizabal, A et.,al 2000 Principles and Methods of Teaching. Quezon City: Phoenix Publishing House Inc.
- Litan, Nilda A. "Effectiveness and Validation of Reading Materials in Filipino for Grade 1 Pupils" Unpublished Thesis, 2007.
- Marinas, Remelizza A. "Effectiveness of Portfolio Kit in the Performance of the College Students in Statistics" Unpublished Master's Thesis, URS Morong, 2007.
- Marino, Wilfredo B. "Development, Validation and Effectiveness of Plane Trigonometry Worktext for First Year College Students" Unpublished Master's Thesis, URS Morong, 2005.
- Masinsin, Gliceria C. "The Perceived Extent of Use and Level of Effectiveness of Selected Methods in Teaching Social Studies" Unpublished Master's Thesis, URS Morong, 2006.
- Mendoza. "The Development and Validation of Laboratory Enrichment Activities on the Histological Changes in White Mice Administered with Herbal Slimming Tea". Unpublished Master's Thesis, URS Morong 2004. Nagle B. (2013). Preparing High School Students for Interdisciplinary Nature of Modern Biology. CBE-Life Sciences Education., April 2013.
- Nagle Berny, "Preparing High School Students for the Interdisciplinary Nature of Modern Biology: CBE-Life Sciences Education, 2013.
- National Research Council (2008) Scientific Research in Education. Washington, DC., National Academy Press.
- Organization for Economic Corporation and Development. "Biology Education Research: Lesson and Future Directions May 13, 2013.
- Patel, JA Development and Implementation of CI to Teach English Grammar to Standard VIII Students in Different Models.
- Perez, Sheila M. "Development Validation and Acceptability of Module in Information and Communication Technology" Unpublished Masters' Thesis, URS Morong, 2007.
- Philippine Constitution of 1987
- Philippine Star Dated June 2008

- Ramos, Sarah D. "Level of Efficacy and Performance of the Teaching Staff of Morong National High School: Basis for Faculty Development Program" Unpublished Master's Thesis TCMC Morong Rizal, 2011.
- Robles, Andropov P. "Development, Validation and Acceptability of Computer Aided Modules in General Sciences for High School Students", Unpublished Masters' Thesis, URS Morong, 2007.
- San Diego, Bernardita L. "Effectiveness of the Videotape Lesson in Differential Calculus on the Performance of Fourth Year High School Students." Unpublished Master's Thesis URS Morong, 2003. San Juan, Jannie A., "Development and Validation of Computer Aided Modules in Advanced Biology for High School Students", Unpublished Masters' Thesis, URS Morong, 2007.
- Singer, H.C. and Bright G.W. "Biology Education Research: Approaches to Research in Teacher Education and Technology", Charlottesville, VA: Association for the Advancement of Computers and Education, Westview, 2013.
- So, Kirk F., "Development Effectiveness and Acceptability of Modules in Computer Aided Instruction in Teaching Human Organ System" Unpublished Masters' Thesis, URS Morong, 2009 Taboada et.,al. "Computer Aided Instruction on Selected Topics in Different Calculus" Unpublished Thesis, COS, 2009.
- Teano, Adora B. "Effectiveness of Integrating the Theory of Constraints for Education (TOCFE) Thinking Tools in Teaching Learning Process in English". Unpublished Master's Thesis, URS Morong, 2007.
- Teologos, Josefina C. "The Reading Proficiency of College Freshmen in the University of Rizal System", Unpublished Masters' Thesis, URS Morong, 2004.
- William, Allen R. and Gibson Al J. "Technology and Learning: The evaluation of Hypertext discussion tool for teaching science literacy to secondary school students" Unpublished Master's Thesis, University of the Philippines.
- Wilson S.M, Floden R.E. and Ferrini-Mundy J. "Teacher Preparation research: Current Knowledge, gaps and recommendations in Teaching" Sratle WA 2009.