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**ABSTRACT**

The study generally aimed to determine the instructional mechanisms utilized by Biology teachers in the five (5) public secondary schools in Naval, Division of Biliran and identify its relationship to students' academic performance. It utilized the descriptive survey method. The survey included seven (7) Biology teachers and 904 Biology students. Teacher-respondents were generally considered young. Most of them were females. Majority of them were taking units leading to M.A. degree. Most of them were least experienced in the job. The in-service trainings they have attended were limited only to school and division levels. The instructional materials they utilized in teaching Biology subject were fairly adequate. With respect to instructional mechanisms, lecture and recitation method was most often used while computer-aided instruction was rarely used. Of the evaluation measures, multiple choice was the only measure used always while diagrams or pictures and role play were rarely used. The academic performance level of the students in Biology subject was approaching proficiency. Teachers' socio-demographic profile and the evaluation measures they utilized do not affect the academic performance of the students. On the other hand, the adequacy of instructional materials and the instructional mechanisms they used influenced the academic performance of the students in the subject.

**KEYWORDS:** instructional mechanisms; Biology; academic performance.

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**INTRODUCTION**

The government recognizes the importance of developing science and technology capability as a means of addressing the concerns of industrialization and globalization. Article XIV, Section 10 of the 1987 Constitution provides: "Science and Technology are essential for national development and progress. The state shall give priority in research and development, invention and innovation, and their utilization to Science and Technology training and service. It shall support indigenous, appropriate and self-reliant scientific and technological capabilities and their application to the country." With this, the education sector, along with other government agencies, is tasked to contribute to the achievement of the national development goals.

However, Science and Mathematics Education in the Philippines has deteriorated because of obsolete discipline-based curriculum. Dr. Merle Tan, University of the Philippines NISMED (National Institute for Science and Mathematics Education Development) Director, said that Science and Math curricula in elementary and high school showed topics which are compartmentalized, inquiry is not encouraged, contents are overcrowded and concepts and topics are repetitive. In a speech before the 170<sup>th</sup> general assembly of the Foundation for Upgrading the Standard of Education, Inc. (FUSE), she proposed to replace the curriculum with spiralling and integrated one which has long been adopted by other countries outperforming the Philippines in assessment. Thus, effective school year 2012-2013, the K to 12 Basic Education Curriculum had been implemented. It follows the spiral approach across the subject by building on the same concepts developed in increasing complexity and sophistication starting from grade school.

Ferrer (2008) pointed out that learning style is one of the variables that affect teaching. Teachers should consider the way students think and the products of their own thinking and culture. Since these variables constitute the pedagogical substance of teaching, every science teacher should begin to consider how to translate them into optimal learning conditions for the students. This necessitates the development of teaching strategies that are geared towards optimization of science learning for all types of students.

Planning effective learning experience is one of the skills the teacher has to develop. It involves a sequence of steps or tasks and one of them is for the teacher to prepare for the setting and selecting instructional strategies for learning to occur. It means the way of and methods by which students can reach the objectives that have been outlined by the teacher in cooperation with his/her students (Navarro, et. al., 1988).

According to Bustos & Espiritu (1996), teaching methods are categorized into two: direct instruction and indirect instruction. The former puts heavy premium in teacher dominance which is based solidly on behaviourism while the latter provides lots of opportunities for students to participate actively and has the elements of discovery, inquiry and exploration. Examples of direct instruction include lecture and demonstration methods while indirect instruction on the other hand includes learning cycle, rational inquiry and experimental approach.

Another distinct pedagogy is the constructivist teaching and cooperative learning. From a constructivist perspective, knowledge is not acquired passively. Students are actively engaged in exploring knowledge. Teacher and learner roles are characterized by negotiation rather than imposition of knowledge through transmission by the teacher to the students. Problem-solving is achieved through conceptual understanding rather than application of prescribed method that is to be memorized by students and reinforced through drill and practice. Cooperative learning on the other hand is an instructional strategy that capitalizes in the energy and coordination of students working together in groups.

Meanwhile, a foreign study in Kenya revealed the effects of cooperative learning where it showed a higher mean achievement compared to regular teaching method. It concluded that cooperative learning approach is an effective instructional mechanism in which teachers should be encouraged to use (Muraya & Kimamo, 2011). Another foreign study in Pakistan on modular approach showed that said approach was more effective instructional paradigm for Biology as compared to traditional method of teaching (Ali, 2005).

Moreover, Tanner & Allen (2004) on their approaches to Biology teaching and learning stated that strategies used in Science classrooms have created a situation referred to as instructional selection in which environments are created where only a subset of learners can succeed. Understanding a variety of learning styles that students bring to a Science classroom will not only help some students learn more Science but also help more students learn any Science.

The foregoing discussion suggests that the methods of teaching are one big factor that contributes to help student learn in a meaningful way in a particular situation. This scenario poses as a humble challenge to the Department of Education in general and the Division of Biliran in particular. Thus, this study was conducted to determine the instructional mechanisms used by the teachers in teaching Biology in the secondary schools of Naval, Biliran and find out its relationship to students' academic performance.

## FRAMEWORK OF THE STUDY

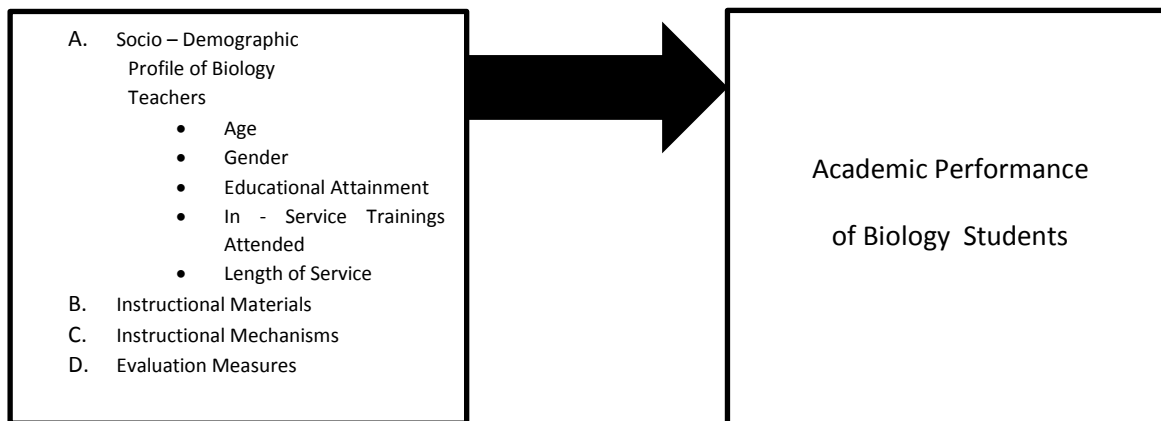
This study is drawn from Bruner's theory of learning. Bruner believes that the learner selects, structures, retains and transforms information. He points out further that if a learner is to use information effectively, it must be translated into his terms, which means that a teacher must strive to see a problem as the learner sees it and provides information that is consistent with the learner's perspective. He further explored the notion that discipline has certain structural elements, ideas and approaches to knowledge and understanding that should guide curriculum development in a manner that connects to the development of a child. Bruner developed the idea that if complex material is broken down into essential ideas, the student can learn the subject matter.

Mayer & Moreno (1998) stated that people learn more deeply in words and pictures than from words alone. They proposed three main assumptions when it comes to learner with multimedia: first, there are two separate channels (auditory and visual) for processing information; second, each channel has limited capacity; and third, learning is an active process of filtering, selecting, organizing and integrating information based upon prior knowledge.

Meanwhile, Bustos & Espiritu (1998) disclosed that there are significant factors that affect transfer of learning in school: first is the mental ability of the learner; second is the nature of subject matter; third are attitudes and efforts of learner and fourth is the manner of teaching.

Teachers today used a variety of classroom practices grounded on established theories. The foregoing notions supported this study on considering the different instructional mechanisms used by Biology teachers in their class. This was done by taking into account two components: the input and the output. The former consisted of the socio-demographic profile of teachers in terms of age, gender, highest educational attainment, length of service, in-service trainings attended, adequacy of instructional materials, instructional mechanisms used, and the evaluation measures utilized by the Biology teachers. The latter, on the other hand, considered the academic performance of Biology students based from their general weighted average from first to second grading periods.

Figure 1 presented the conceptual framework of the study.



*Figure 1. Conceptual framework of the study*

## METHODOLOGY

This study used the descriptive survey method wherein questionnaires were utilized to derive data like the instructional mechanisms used by the Biology teachers and other variables involved. Respondents were seven (7) Biology teachers and 904 students from the five (5) secondary schools in the municipality of Naval, Division of Biliran. Said schools' names were designated as A, B, C, D and E.

The data gathered were analysed according to their corresponding quantitative equivalents. Descriptive statistics such as frequency, percentage distribution and ranking were used to describe the socio-demographic profiles of Biology teachers. Weighted mean was used to describe the adequacy of instructional materials, instructional mechanisms and evaluation measures. For testing the relationship, Spearman Difference Coefficient of Correlation ( $r's$ ) was used and t-test was used to determine the significance error of  $r$ .

## RESULTS AND DISCUSSION

This portion of the study discussed the socio-demographic profile of the Biology teachers, adequacy of instructional materials used, the instructional mechanisms utilized, the evaluation measures employed, the academic performance of Biology students, and the relationships of the variables.

### Socio-Demographic Profile of Biology Teachers

**Age.** Data on Table 1 revealed that there was only one (1) or 14.29 per cent of the respondents belonged to middle age while six (6) or 85.71 per cent was categorized as young. With no respondent falling under the old age group, it can be gleaned that almost all of the respondents were still considered young. This would imply that the Biology teachers of the five (5) public secondary schools in the municipality of Naval, Division of Biliran are still going to serve a considerable number of years in the service.

Age	f	%
60 years and above	0	0
40 – 59 years	1	14.29
20 – 39 years	6	85.71

	Total	7	100.00
Gender	f		%
Male		1	14.3
Female		6	85.7
	Total	7	100.00
Educational Attainment	f		%
Doctoral degree holder		0	0
M.A. with doctoral units		0	0
M.A. degree holder		0	0
B.S. with M.A. units		5	71.4
B.S. degree holder		2	28.6
	Total	7	100
Length of Service	f		%
25 years and above		0	0
21 – 24 years		0	0
16 – 20 years		0	0
10 – 15 years		3	42.86
Below 10 years		4	57.14
	Total	7	100
In-Service Trainings Attended*	f		Rank
National		1	4
Regional		4	3
Division		5	1.5
School		5	1.5

\*Multiple response

*Table 1. Socio-demographic profile of the teacher-respondents*

**Gender.** With respect to gender, the same table disclosed where the male group was outnumbered by the female group, the former revealed only one (1) or 14.3 per cent while the latter had six (6) or 85.7 per cent. Data showed that almost all of the teacher-respondents were females which would imply that the female group is more inclined than the opposite gender in teaching Biology subject in the public secondary schools in the municipality of Naval, Division of Biliran.

**Educational Attainment.** Data on Table 1 showed that two (2) or 28.6 per cent of the teacher-respondents were holders of BS degree and the other five (5) or 71.4 per cent were BS degree holders with MA units. With no teacher having earned either MA or doctoral degree, the data suggest that most of the teacher-respondents were just taking up units or subjects leading to MA degree. This would further imply that much more efforts are still needed by the Biology teachers of the public secondary schools in the municipality of Naval, Division of Biliran to grow professionally.

**Length of Service.** The same table reflected four (4) or 57.14 per cent of the teacher-respondents whose length of service was below ten (10) years and three (3) or 42.86 per cent whose experience was 10-15 years. No teacher had served for more than 15 years which would show that the teacher-respondents were least experienced in the job. This would further imply that the Biology teachers of the public secondary schools in the municipality of Naval, Division of Biliran should consider a number of additional years in the service for them to be considered experienced or highly-experienced as far as teaching Biology subject is concerned.

**In-Service Trainings Attended.** Data on Table 1 revealed that school and division levels of in-service trainings attended by teacher-respondents ranked first, followed by the regional level then the national level. It can be gleaned from the data that most in-service trainings attended by the teacher-respondents were only school and division levels. This would imply that the Biology teachers of the public secondary schools in the municipality of Naval, Division of

Biliran still needed regional as well as national levels of in-service trainings for them to be more equipped and effective in their respective teaching jobs.

**Instructional Materials Utilized by Biology Teachers**

The instructional materials utilized by Biology teachers included instructional media, journals and magazines, teaching guides, teaching devices, visual aids and non-teaching aids. A total of 25 instructional materials were subjected for responses by the respondents.

**Instructional Media.** Data in Table 2 showed that all items under instructional media like projector, transparency machine and film were all rated “very inadequate” by the teacher-respondents with weighted means of 1.7, 1.1 and 1.2 respectively. The average weighted mean of 1.33 further showed that instructional media in the public secondary schools in the municipality of Naval was “very inadequate”. This would imply that much more efforts must be exerted by the schools concerned in acquiring said instructional media thus making teaching in Biology subject more responsive to the changing needs and time.

**Journals and Magazines.** With respect to journals and magazines, items Health and Science and Math with a mean of 2.0 and Journal of Science with a mean of 2.5 were rated “inadequate” while items Science Review with a mean of 3.0 and Science Bulletin with a mean of 3.1 were a little bit rated higher as “fairly adequate”. The average weighted mean of 2.65 revealed that science journals and magazines in the public secondary schools in the municipality of Naval was “inadequate”. Data would imply that said schools must find ways and means to provide more science journals and magazines to their students as supplement for the teachers’ job in teaching Biology subject.

**Teaching Guides.** Under teaching guides, the same table disclosed wherein items: Prepared Lesson Plan, Teacher’s Manual and Teaching for Science were all rated “very adequate” with respective means of 4.7, 4.4 and 4.7. Only one (1) item, Teacher’s Edition, was rated “adequate” with a mean of 2.7. It can be gleaned from the data that the teaching guides utilized by the Biology teachers were generally rated as “adequate”. This would imply that the concerned secondary schools in the municipality of Naval must maintain or even improve a little bit more the provision of teaching guides to make teaching-learning atmosphere in Biology subject reach its optimum.

**Teaching Devices.** With respect to teaching devices, items: printed written materials, pamphlets and clippings were rated “fairly adequate” with means of 3.1, 2.8 and 3.1 respectively. Only one (1) item, that is, periodicals, was rated “inadequate” with a mean of 2.0. The data disclosed that the teaching devices utilized by the Biology teachers in the public secondary schools of the municipality of Naval were generally rated “fairly adequate” with an average weighted mean of 2.75. Said data would imply that there is still a need for the concerned schools for additional provisions of teaching devices in so far as teaching Biology subject is concerned.

**Visual Aids.** In terms of visual aids, items: dioramas with a mean of 1.8, cine devices with a mean of 1.5 and film slides with a mean of 1.2 were rated “very inadequate” by the teacher-respondents. Item television with a mean of 2.4 was rated “inadequate” while item pictures with a mean of 3.1 was rated “fairly adequate”. With an average weighted mean of 2.0, visual aids utilized by the Biology teachers in the public secondary schools of the municipality of Naval were generally considered “inadequate”. This would imply that there is a big need for the concerned secondary schools to acquire more said visual aids for the teachers to become more effective in teaching Biology subject.

**Non-Teaching Aids.** Under non-teaching aids, items: cooling device, working table and lighting with respective means of 3.8, 4.0 and 3.5 were rated as “adequate” while item laboratory room with a mean of 2.4 was rated “inadequate” and item chairs with a mean of 4.7 was rated “very adequate”. With an average weighted mean of 3.68, it can be gleaned from the data that the non-teaching aids of the public secondary schools in the municipality of Naval were “adequate”. Data would imply that said schools should not only maintain but even improve or sophisticate its non-teaching aids specifically on laboratory room which was rated “inadequate” in order for the Biology experiments to be performed well.

Indicators	WM	Description
Instructional Materials		

<b>Instructional Media</b>		
Projector	1.7	Very Inadequate
Transparency Machine	1.1	Very Inadequate
Film	1.2	Very Inadequate
<b>AWM</b>	<b>1.33</b>	<b>Very Inadequate</b>
<b>Journals and Magazines</b>		
Health and Science & Math	2.0	Inadequate
Science Review	3.0	Fairly Adequate
Journal of Science	2.5	Inadequate
Science Bulletin	3.1	Fairly Adequate
<b>AWM</b>	<b>2.65</b>	<b>Inadequate</b>
<b>Teaching Guides</b>		
Prepared Lesson Plan	4.7	Very Adequate
Teacher's Manual	4.4	Very Adequate
Teacher's Edition	2.7	Adequate
Teaching for Science	4.7	Very Adequate
<b>AWM</b>	<b>4.12</b>	<b>Adequate</b>
<b>Teaching Devices</b>		
Printed Written Materials	3.1	Fairly Adequate
Periodicals	2.0	Inadequate
Pamphlets	2.8	Fairly Adequate
Clippings	3.1	Fairly Adequate
<b>AWM</b>	<b>2.75</b>	<b>Fairly Adequate</b>
<b>Visual Aids</b>		
Pictures	3.1	Fairly Adequate
Dioramas	1.8	Very Inadequate
Cine Devices	1.5	Very Inadequate
Television	2.4	Inadequate
Film Slides	1.2	Very Inadequate
<b>AWM</b>	<b>2.0</b>	<b>Inadequate</b>
<b>Non-Teaching Aids</b>		
Cooling Device	3.8	Adequate
Chairs	4.7	Very Adequate
Laboratory Room	2.4	Inadequate
Working Table	4.0	Adequate
Lighting	3.5	Adequate
<b>AWM</b>	<b>3.68</b>	<b>Adequate</b>
<b>Overall Mean</b>	<b>2.75</b>	<b>FAIRLY ADEQUATE</b>

*Table 2. Instructional materials used by Biology teachers*

The overall mean of 2.75 showed that the instructional materials utilized by the Biology teachers in the public secondary schools in the municipality of Naval were "fairly adequate". This would suggest that school administration and teachers should work hand in hand in order to improve or acquire more said instructional materials.

### **Instructional Mechanisms Used by Biology Teachers**

The primary aim of the study was to determine the instructional mechanisms used by Biology teachers in the public secondary schools in the municipality of Naval, Division of Biliran and identify its relationship to students' academic performance. This was done through survey conducted to teacher-respondents. There were eleven (11) instructional mechanisms subjected for responses by the teacher-respondents.

Table 3 presents the instructional mechanisms used by Biology teachers with its weighted mean and description.

Instructional Mechanism	WM	Description
Concept mapping	3.8	Often
Cooperative learning	4.0	Often
Discovery approach	3.2	Seldom
Laboratory method	3.2	Seldom
Lecture and recitation method	4.5	Often
Multimedia instruction	3.4	Seldom
Project collection method	4.0	Often
Computer-assisted instruction	2.7	Rarely
Role playing and games	3.1	Seldom
Experimental method	3.4	Seldom
Demonstration method	4.1	Often

*Table 3. Instructional Mechanisms Used by Biology Teachers*

It can be gleaned from the data in Table 3 that lecture and recitation method obtained the highest weighted mean of 4.5 considered as “often used” mechanism. This would suggest that the said method is still the basic or the most common instructional mechanism used by Biology teachers in dealing with their students.

Other methods “often used” by Biology teachers were: concept mapping, cooperative learning, project collection method and demonstration method with weighted means of 3.8, 4.0, 4.0 and 4.1 respectively.

Five (5) instructional mechanisms were considered “seldom used” by the Biology teachers, namely: discovery approach, laboratory method, multimedia instruction, role playing and games and experimental method with their respective weighted means of 3.2, 3.2, 3.4, 3.1 and 3.4.

Obtaining the lowest weighted mean of 2.7 was computer-assisted instruction, described as a “rarely used” method. This would imply that the Biology teachers considered this kind of method to be inapplicable or least effective considering that some or most of their students are not computer-literates.

#### **Evaluation Measures Utilized by Biology Teachers**

There were sixteen (16) evaluation measures subjected for responses by the teacher-respondents. These were presented in Table 4.

Evaluation Measures	WM	Description
Multiple Choice	4.7	Always
Matching Type	4.0	Often
True or False	3.2	Seldom
Completion Type Items	3.7	Often
Essay	3.4	Seldom
Portfolio	4.1	Often
KWL Chart	3.8	Often
Concept Mapping	3.5	Seldom
Creative Assessment	3.5	Seldom
Journals	3.2	Seldom
Oral Interview	4.1	Often
Problem Test	3.0	Seldom
Diagrams or Pictures	2.5	Rarely
Practical Test	4.2	Often
Role Play	2.5	Rarely
Project	4.2	Often

*Table 4. Evaluation measures utilized by Biology teachers*

Table 4 disclosed that the evaluation measure which obtained the highest weighted mean of 4.7 was multiple choice – described as “always used” measure. This would denote that multiple choice is still the most basic and common evaluation measure utilized by Biology teachers in the public secondary schools in the municipality of Naval.

This was followed by evaluation measures described as “often used”, namely: matching type, completion type items, portfolio, KWL chart, oral interview, practical test and project which obtained the respective weighted means of 4.0, 3.7, 4.1, 3.8, 4.1, 4.2 and 4.2.

Evaluation measures like: true or false, essay, concept mapping, creative assessment, journals, and problem test were perceived by the teacher-respondents as “seldom used” with obtained weighted means of 3.2, 3.4, 3.5, 3.5, 3.2 and 3.0.

Two (2) other evaluation measures, diagrams or pictures and role play obtained the same weighted mean of 2.5 and were perceived by the respondents as “rarely used” measure. This would imply that the Biology teachers of the public secondary schools in the municipality of Naval regarded diagrams or pictures and role play as least effective or inapplicable evaluation measures considering that it has less bearing or relevance to Biology subject.

### Academic Performance of Biology Students

The academic performance of Biology students from the five (5) public secondary schools in the municipality of Naval was determined by obtaining their general average grades from first to second grading periods. Each school’s name was designated as A, B, C, D and E. Table 5 presents the academic performance of Biology students with its interpretation.

Name of School	First Grading	Second Grading	General Average	Interpretation
A	81.83	84.62	83.23	Approaching Proficiency
B	80.58	82.68	81.63	Approaching Proficiency
C	80.92	78.99	79.96	Approaching Proficiency
D	77.96	79.60	78.78	Developing
E	80.82	80.14	80.48	Approaching Proficiency
Overall Average	80.42	81.21	80.81	Approaching Proficiency

*Table 5. Academic performance of Biology students*

It can be gleaned from Table 5 that Biology students from school A obtained the highest general average of 83.23 whose level of academic performance was interpreted as “approaching proficiency”. The same level of academic performance, “approaching proficiency”, was achieved by Biology students coming from schools B, E and C with obtained general averages of 81.63, 80.48 and 79.96 respectively. Students from school D had the lowest general average of 78.78 interpreted as “developing” level of academic performance.

Data from same table indicated that the overall academic performance of Biology students coming from the five public secondary schools in the municipality of Naval was “approaching proficiency” level with an obtained overall average of 80.81. This would imply that much more efforts are still needed by the Biology teachers in their teaching so that students’ academic performance will reach “proficient” or “mastery” level.

### Relationships of Variables

This section presents the significant relationship between variables which include the socio-demographic profile of Biology teachers and students’ academic performance, instructional materials utilized and students’ academic performance, the instructional mechanisms used by Biology teachers and students’ academic performance and the evaluation measures utilized by Biology teachers and students’ academic performance.

**Socio-demographic profile of Biology teachers and students’ academic performance.** Table 6 presented the relationship between the socio-demographic profile of Biology teachers and the academic performance of the students.



Variables	r	cv	tv	Decision
Socio-demographic profile of Biology teachers and students' academic performance	0.8	2.31	3.182	Ho1 Accepted

*Alpha level of significance = .05*

*df = 3*

**Table 6. Relationship between the socio-demographic profile of Biology teachers and students' academic performance**

As shown in Table 6, at .05 alpha level of significance, the computed value of 2.31 was lesser than the tabled value of 3.182. This signified that the null hypothesis which stated that "There is no significant relationship between the socio-demographic profile of Biology teachers and the academic performance of Biology students" was accepted. Result would imply that the socio-demographic profile of Biology teachers such as age, gender, educational attainment, in-service trainings attended and length of service have nothing to do with the academic performance of Biology students.

**Adequacy of instructional materials utilized by Biology teachers and students' academic performance.** Table 7 showed the relationship between the adequacy of instructional materials utilized by Biology teachers and students' academic performance.

Variables	r	cv	tv	Decision
Adequacy of instructional materials utilized by Biology teachers and students' academic performance	0.9	3.55	3.182	Ho2 Rejected

*Alpha level of significance = .05*

*df = 3*

**Table 7. Relationship between the adequacy of instructional materials utilized by Biology teachers and students' academic performance**

Data in Table 7 showed the computed value of 3.55 was higher than the tabled value of 3.182 at .05 alpha level of significance. The null hypothesis that "There is no significant relationship between adequacy of instructional materials used by Biology teachers and the academic performance of Biology students is rejected. The result would imply that the more instructional materials like instructional media, journals and magazines, teaching guides, teaching devices, visual aids and non-teaching aids are utilized by Biology teachers, the more the students would perform better in the subject.

**Instructional mechanisms used by Biology teachers and academic performance of students.** Data in Table 8 revealed the relationship between the instructional mechanisms utilized by Biology teachers and the academic performance of students.

Variables	r	cv	tv	Decision
Instructional mechanisms used by Biology teachers and academic performance of students	0.92	4.08	3.182	Ho3 Rejected

*Alpha level of significance = .05*

*df = 3*

Table 8. Relationship between the instructional mechanisms used by Biology teachers and academic performance of students

Data in Table 8 revealed a high correlation between the computed value of 4.08 which was greater than the tabled value of 3.182 at .05 alpha level of significance. Hence, the null hypothesis that "There is no significant relationship between the instructional mechanisms used by Biology teachers and academic performance of Biology students" was rejected. Result would imply that instructional mechanisms utilized by Biology teachers like: lecture and recitation method, cooperative learning, concept mapping, project collection method, demonstration method, etc. greatly influenced the academic performance of students in Biology subject.

**Evaluation measures used by Biology teachers and students' academic performance.** Table 9 presented the relationship between the evaluation measures used by Biology teachers and the academic performance of the students.

Variables	r	cv	tv	Decision
Evaluation measures used by Biology teachers and students' academic performance	0.75	1.97	3.182	Ho4 Accepted

*Alpha level of significance = .05*

*df = 3*

Table 9. Relationship between the evaluation measures used by Biology teachers and the academic performance of the students

As shown in Table 9, the computed value of 1.97 was lesser than the tabled value of 3.182 at .05 alpha level of significance. Hence, the null hypothesis that "There is no significant relationship between the evaluation measures utilized by Biology teachers and the academic performance of students" was accepted. This would imply that the evaluation measures used by Biology teachers like: multiple choice, matching type, creative assessment, practical test, concept mapping, oral interview, etc. do not affect the academic performance of the students in the said subject.

### CONCLUSION

Biology teachers of the five (5) public secondary schools in Naval, Division of Biliran are still going to serve a considerable number of years. Mostly females are more inclined in teaching the subject as compared to males. Most of them need to pursue further studies in order to grow professionally and be more competent in their career. In-service trainings especially in the regional and national levels would be of great help to their job.

With the students' academic performance level which was approaching proficiency, the adequacy of instructional materials and the instructional mechanisms teachers utilized are vital to further improve the students' performance in the subject.

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### APPENDIX A

#### SURVEY QUESTIONNAIRE FOR BIOLOGY TEACHERS

Date \_\_\_\_\_

Dear Fellow Teachers,

Please feel free in answering the questionnaire based on the actual happening in your respective school and classroom. Do not leave any question unanswered. Be confident that your answers will be treated according to the Ethics of Research.

SCHOOL: \_\_\_\_\_

ADDRESS: \_\_\_\_\_  
Directions: Put check on each item in the space provided below.

I. Socio-Demographic Profile

Name: \_\_\_\_\_ (optional)  
Age: \_\_\_\_\_ Sex: ( ) Male ( ) Female

Highest Educational Attainment:

- ( ) Doctoral Degree ( ) BS with M.A Units  
( ) M.A with Doctoral Units ( ) BS/AB  
( ) M.A Degree Holder

Length of service:

- ( ) 25 years and above  
( ) 21-24 years  
( ) 16-20 years  
( ) 10-15 years  
( ) below 10 years

In- Service Training:

- ( ) National  
( ) Regional  
( ) Division  
( ) School

II. Adequacy of Instructional Materials

Directions: Kindly put a check on the space provided to determine the adequacy of instructional materials you utilized in teaching Biology subject. Use the following guides indicated below.

- 5 VA- Very Adequate- is more what the students need  
4 A- Adequate- just enough for the students  
3 FA- Fairly Adequate- fairly enough with few unit  
2 IA- Inadequate- nearly one- half of the students do not have one to use  
1 VIA- Very Inadequate- more than one- half of students do not have one to use

Adequacy of Instructional Materials

Instructional Materials	VA 5	A 4	FA 3	IA 2	VIA 1
<b>1. Instructional Media</b>					
Projector					
Transparency Machine					
Film					
<b>2. Journal &amp; Magazine</b>					
Health & Science & Math					
Science Review					
The Journal of Science					
Science Bulletin					
<b>3. Teaching Guides</b>					
Prepared Lesson Plan					
Teacher's Manual					
Teacher's Edition					
Teaching for Science					
<b>4. Teaching Devices</b>					
Printed Written Materials					

Periodicals					
Pamphlets					
Clippings					
<b>5. Visual Aids</b>					
Pictures					
Dioramas					
Cine Devices					
Television					
Film Slides					
<b>6. Non- Teaching Aids</b>					
Cooling Device					
Chairs					
Laboratory Room					
Working Table					
Lighting					

#### Instructional Mechanisms Used by Biology Teachers

Direction: Kindly put a check on the space provided to determine the frequency of instructional mechanisms you employed in teaching Biology subject. Use the following guides indicated below.

- 5 A- Always- when the strategy is always employed
- 4 O- Often- when the strategy is often employed
- 3 S- Sometimes- when the strategy is sometimes employed
- 2 R- Rarely- when the strategy is rarely employed
- 1 N- Never- when the strategy is not employed

Instructional Mechanisms	A 5	O 4	S 3	R 2	N 1
Concept Mapping					
Cooperative Learning					
Discovery Approach					
Laboratory Method					
Lecture and Recitation Method					
Multimedia Instruction					
Project/Collection Method					
Computer Assisted Instruction					
Role Playing and Games					
Experimental Method					
Demonstration Method					

#### IV. Evaluation Measures Utilized by Biology Teachers

Direction. Kindly put a check on the space provided to determine the frequency of the evaluation measures you employed in teaching Biology subject.

- 5 A – Always – when the evaluation measure is always employed
- 4 O – Often – when the evaluation measure is often employed
- 3 S – Sometimes – when the evaluation measure is sometimes employed
- 2 R – Rarely – when the evaluation measure is rarely employed
- 1 N – Never – when the evaluation measure is never employed

Evaluation Measures	A	O	S	R	N
	5	4	3	2	1
Multiple Choice Type					
Matching Type					
True or False Type					
Completion Type Items (Fill in the blanks)					
Essay					
Portfolio					
KWL Chart					
Concept Mapping					
Creative Assessment					
Journals					
Oral Interview/Recitation					
Problem Test					
Diagrams or Picture Type of Test					
Practical Test					
Role Play/Drama					
Projects					
Other Evaluation Measures (Pls. specify)					

V. Academic Performance of Biology Students

Direction: Please fill up with the grades and the general average of your Biology students.

Name of School:

Name of Student (Initials only)	1 <sup>st</sup> Grading Period	2 <sup>nd</sup> Grading Period	General Average

**APPENDIX B**

**INSTRUCTIONAL MECHANISMS USED IN TEACHING BIOLOGY**

1. Concept Mapping – is a special form of a web diagram for exploring knowledge and gathering and sharing information. Concept mapping is employed to develop connections among concepts in the unit. A concept map consists of nodes or cells and links. The nodes contain the concepts and are usually enclosed in a box or circle. The links are represented by arrows. The labels in the links explain the relationship between the nodes. The arrow describes the direction of the relationship and is read like a sentence.

2. Cooperative Learning – is an instructional strategy that capitalizes on the energy and coordination of students working together in groups. The primary goals include problem solving, the development of social interactive skills and group mastery of academic materials.

3. Discovery Approach – is where the teacher gives out the materials to students and let them explore the concept through the manipulation of the materials by themselves (pure discovery) or with the guidance from the teacher (guided inquiry).

4. Laboratory Method - the students do the experiment in the laboratory with “hands-on” apparatus and materials to study scientific relationship. The teacher guides them as they perform the experiment individually or by group.
5. Lecture and Recitation Method – these strategies are all teacher-centered. It can be used to explain, demonstrate, present information, ask questions, and students answer on the topic to be taken up. Lectures may vary in form, like demonstration teaching, practice or drill and view.
6. Multimedia Instruction – are technology-aided strategies aimed at providing valuable experiences through instructional devices that can be viewed and heard like overhead projectors, slide shows, power point lectures, digital videos, graphics, instructional tapes, computers and the internet. The role of the teacher is to follow-up after the presentation to concretize the skills learned.
7. Project Collection Method – the teacher assigns project or to collect materials, organisms or objects to enable the learner by doing, seeing and handling materials. A meaning of variation in objects/organisms in a classified presentation.
8. Computer-Assisted Instruction – a strategy that involves the use of computers to present drills, practical exercises and tutorial sequences to students and sometimes to engage the student in a dialogue about the substance of the instruction.
9. Role Playing and Games – Games can teach students to work together as a well-coordinated team. It develops coordination skills which are necessary to perform delicate jobs.
10. Experimental Method – is a mode of inquiry teaching. It is used in situations like stating the problem, formulating hypothesis, structuring test for hypotheses, experimenting, and discussing results. In the experimental method, the plan for testing the workability of a solution is discussed and decided prior to using the materials.
11. Demonstration Method – is a class activity in which the teacher stands before the class and performs an experiment for them. This is followed by question and answer or discussion.

## **APPENDIX C**

### **EVALUATION MEASURES UTILIZED BY BIOLOGY TEACHERS**

1. Multiple Choice – consists of a stem and options. The student has to choose from a number of options. In most forms, one of the options is the correct answer and the others are distracters. This test is effective for testing knowledge and memory and for problem-solving in convergent subject areas.
2. Matching Type – matching types rely on students being able to establish associations between two lists of elements called premises and responses.
3. True or False – is a selected response type that limits the student to one definite answer.
4. Completion Type Items – are used to test students’ recall of factual items. These types of test are relatively easy to use and evaluate.
5. Essay – is an example of supply type, free response testing, where the students must organize their thoughts and develop a complex answer in order to be evaluated. In most theoretical subjects, an essay test can give the evaluator a more complete and accurate overview of the achievement of higher level cognitive.
6. Portfolio – is used to gather information about the students. Students put together the materials they have produced about a science concept. It is highly individualized and students can use it to evaluate themselves and gain a realistic picture of what they have accomplished in a unit, quarter, semester or year.

7. KWL Chart – it provides the teacher with information on the students’ preconceptions and interests. It documents the progress of the class as a whole and not individual attainment.
8. Concept Mapping – is a form of organizer that represents student thinking. The mental map depicts complex relationships of concepts.
9. Creative Assessment – is a task associated with scoring schemes called rubrics that requires a student to produce something or perform in some way.
10. Journals – these provide insights about a student’s level of understanding.
11. Oral Interview – involves observing and questioning students to find out more about their cognitive processes, levels of understanding, and ability to make connections and apply concepts. Interviews also reveal students’ feelings and attitudes about science.
12. Problem Test – is a tense time for most students and any effort extended to make the process run smoothly and minimize interruptions will generally be reflected in improved student morale and performance.
13. Diagrams or Pictures – an assessment of understanding where a student draws circles or squares to show the relationship of objects, events or abstractions to one another.
14. Practical Test – consists of any activity that allows learners to demonstrate their technical and/or behavioural skills directly. The assessment may be based on the end-result of the activity (the product), or the carrying-out of the activity (the process), or a combination of both.
15. Role Play – provides many opportunities for students to use kinaesthetic, artistic, musical, spatial and other modalities to demonstrate their understanding of science concepts.
16. Project – any exercise or investigation in which the time constraints have been relaxed. Projects provide a useful way of bringing together assessment of a wide range of skills and of integrating different activities.

#### APPENDIX D

##### TALLIED RESULTS ON INSTRUCTIONAL MATERIALS UTILIZED BY BIOLOGY TEACHERS

Instructional Materials	VA	A	FA	IA	VIA
<b>Instructional Media</b>					
Projector	0	0	2	1	4
Transparency machine	0	0	0	1	6
Film	0	0	0	2	5
<b>Journals and Magazines</b>					
Health and Science	0	0	1	5	1
Science Review	0	1	5	1	0
The Journal of Science	0	0	5	1	1
Science Bulletin	1	2	2	1	1
<b>Teaching Guides</b>					
Prepared Lesson Plan	5	2	0	0	0
Teacher’s Manual	3	4	0	0	0
Teacher’s Edition	1	2	0	2	2
Teaching for Science	3	3	0	1	0
<b>Teaching Devices</b>					
Printed written materials	1	2	4	0	0
Periodicals	0	0	4	1	2
Pamphlets	0	0	6	1	0
Clippings	0	1	6	0	0

<b>Visual Aids</b>					
Pictures	0	3	2	2	0
Dioramas	0	1	0	3	3
Cine devices	0	0	1	2	4
Television	0	1	1	3	2
Film slides	0	0	0	3	4
<b>Non-Teaching Aids</b>					
Cooling device	0	0	5	0	2
Chairs	4	2	1	0	0
Laboratory room	2	1	0	1	3
Working table	0	2	2	0	3
Lighting	2	0	3	1	1

**APPENDIX E**
**TALLIED RESULTS ON INSTRUCTIONAL MECHANISMS USED BY BIOLOGY TEACHERS**

<b>Instructional Mechanisms</b>	A (5)	O (4)	S (3)	R (2)	N (1)
Concept Mapping	0	6	1	0	0
Cooperative Learning	0	7	0	0	0
Discovery Approach	0	2	5	0	0
Laboratory Method	1	1	4	1	0
Lecture and Recitation Method	4	3	0	0	0
Multimedia Instruction	0	4	2	1	0
Project Collection Method	2	3	2	0	0
Computer Assisted Instruction	0	4	1	2	0
Role Playing and Games	0	1	6	0	0
Experimental Method	1	1	5	0	0
Demonstration Method	1	6	0	0	0

**APPENDIX F**
**TALLIED RESULTS ON EVALUATION MEASURES USED BY BIOLOGY TEACHERS**

<b>Evaluation Measures</b>	A (5)	O (4)	S (3)	R (2)	N (1)
Multiple Choice	5	2	0	0	0
Matching Type	2	3	2	0	0
True or False	1	2	2	2	0
Completion Type Items	2	2	2	1	0
Essay	1	2	3	1	0
Portfolio	5	0	0	2	0
KWL Chart	1	4	2	0	0
Concept Mapping	0	4	3	0	0
Creative Assessment	1	3	2	1	0
Journals	3	1	0	2	1
Oral Interview	2	4	1	0	0
Problem Test	0	0	7	0	0
Diagrams or Pictures	0	3	2	2	0
Practical Tests	0	0	4	3	0
Role Play	0	0	4	3	0
Project	3	3	1	0	0