REVITALIZING SCIENCE INSTRUCTION IN BASIC EDUCATION IN THE PROVINCE OF BATANGAS

[1]MARITES R. MACASIAB, Ed.D., [2]NORRIE E. GAYETA, Ph.D
[1]0000-0002-3531-0979 [2]0000-0002-2965-8311
[1]marites.macasiab@deped.gov.ph,[2]norrie.gayeta@gbatstate u.edu.ph
[1]San Pedro National High School,Division of Batangas, Department of Education
[2]Batangas State University, Main I, CTE,Rizal Avenue, Batangas City, Philippines

ABSTRACT

This study assessed Science instruction in basic education in Batangas Province for the purpose of developing a management program to revitalize instruction toward quality education. The study covered the respondents' profile and assessment of Science instruction and investigated the managerial potentials of administrators and the issues and concerns in managing Science instruction. The study employed the descriptive research design and used a questionnaire as main data gathering tool. Respondents of the study were 117 administrators and 300 Science teachers. Frequency count, percentage, weighted mean, t-test, and ANOVA were used as statistical tools. Results showed that both respondents were at the middle-aged, married females, were master's degree holders, had considerable years of service and were active in attending seminars. Both respondents assessed Science instruction in all areas as evident but considered materials and facilities as moderately evident. Significant differences were noted on the assessments of teachers on the areas of methods and strategies when grouped according to civil status. Study also revealed that both respondents manifested managerial potentials specifically concurring on their leadership, and supervisory functions. Sufficiency of laboratory equipment, and availability of Science laboratory room were the primary issues and concern in Science instruction. The proposed management program highlights some specific activities and suggested strategies and covered the issues and concerns in managing Science instruction. The study recommended that Science instruction be revisited to effectively address issues affecting the delivery of instruction. Furthermore, the proposed management program may be shown to Science supervisors and other DepEd authorities for their suggestions and enhancement before the implementation.

Keywords: revitalize Science instruction, management program, assessment, Science instruction, strategies

INTRODUCTION

The acquisition and enhancement of knowledge and skills in Science essential in meeting the demands of the highly competitive and scientifically inclined society must be given more attention (Stewart, 2010; Wilmarth, 2010). Thus, there is a heightened demand for quality of Science instruction which poses high expectations in improving the teaching of Science.

In achieving the high expectations in Science education, good Science curriculum, highly competent teachers, good management and proper monitoring and evaluation are important. In addition, there is a need to have complete resources that can be used in the teaching and learning process such as, materials and facilities.

Moreover, consideration should be given in providing further professional development for teachers in Sciences. Professional development programs should be based on the needs of Science educators of both individuals and

members of collaborative groups who are involved in the program. Ongoing professional development initiatives should be assessed and refined to meet teachers' changing needs. Effective professional development includes training, practice, and feedback. There should be dual purpose of improving the teachers' own conceptual understanding as well as their ability to provide effective learning opportunities for teachers to share their expertise and experience more systematically (Hammond et al., 2017; Zepeda, 2013).

Although some Filipino students have gained recognition for their high level of accomplishments in the International Science and Engineering Fair, Robotics Competition, and Physics Olympiad, their accomplishments are overshadowed by the consistently poor performance of other Filipino students. Also, international assessment and national assessment studies revealed that Filipino students have low retention of concepts, have limited reasoning and analytical skills, and poor communication skills. In addition, a large percentage of Grade 6 and fourth-year students cannot apply concepts to real-life problem-solving situations nor design an investigation to solve a problem. Several factors identified behind the low performance in Science of Filipino students are the quality of teachers, the teaching-learning process, the school curriculum, instructional materials, and administrative support (Brawner, 2011).

Similarly, based on the Department of Education (DepEd) data, the performance of the country's public high school students in the National Achievement Test (NAT) has been on the decline in three consecutive years from 2012 to 2016 and are significantly lower than the scores of public elementary students. In addition, based on the Global Competitiveness Report, the Philippines ranked 67th out of 140 countries in quality of math and Science education in the year 2015-2016 (Schwab, 2016). Also, poor performance of students is affected by several factors such as lack of Science equipment, inadequate numbers of teachers, lack of teaching and learning materials, and poor teaching methods Based on the data presented, the Philippines is behind in terms of Science education. Support from the teachers and administrators are needed in addressing the issue. Areas such as curriculum, materials and facilities, methods and strategies including evaluation and techniques must be taken into consideration.

With all these reasons, the role of teachers and administrators is to support the improvement of Science instruction. They need to provide the resources needed in the teaching learning process. The administrators, being the manager, need to check the way teachers use the different methods and strategies in delivering the lesson to the students and how they affect the quality of Science instruction. They should assist the teachers in delivering Science instruction to achieve quality Science education.

However, despite of the massive implementation of the new curriculum, there are some issues and challenges experienced by the Science teachers in the field hindering them to fully deliver Science instruction among their students (Cocal & Marcelano, 2017). There is really a need to add additional budget in education, seminars and workshops in order to prepare the teachers in the new curriculum, new textbooks and new buildings are needed to support the said curriculum (Krajcik & Delen, 2017). In this view, complete laboratory rooms are necessary for Science instruction to improve scientific literacy of both the teachers and the 21st century learners. With limited number of equipment, chemicals, and other laboratory materials needed in discovering new ideas among the learners, the full attainment of competencies in Science may not be attained. Laboratory facilities will be of great help on the part of the teachers and students to conduct experiments to discover new learnings and develop their own concepts. Laboratory work facilitates deeper understanding of Science and technology processes. With active participation of students, critical thinking skills are developed (Mulela, 2015; Farrer, 2018). Laboratory activities also provide concrete experiences on part of the students. Generally, lack of instructional material, and inadequacy of laboratory facilities hinder Science teachers to perform at best capability.

Based on the cited scenario in Science education in the country and the actual

assessment of the researcher on performance of students in Science gathered during classroom observation, there is an urgent need to revitalize Science instruction in the province of Batangas. The strong desire of the researcher to establish quality education droves her to conduct the study. In the same manner, the researcher being the Science Department head believes that a management program that will address the holistic needs of Science instruction must be developed. Management program that will provide tailor-fit strategically planned activities and projects focusing on the improvement of the teaching of Science. Authentic activities suited to the needs of the students are necessary to become updated with various teaching strategies and laboratory materials needed that can improve the quality of Science instruction.

OBJECTIVES OF THE STUDY

This study assessed Science instruction in basic education in Batangas Province with the end view of proposing a management program for the purpose of revitalizing instruction toward quality Science education.

Specifically, it aimed to address the following objectives:

1. Describe the profile of the administrators and teachers in terms of:
    - 1.1 age
    - 1.2 sex
    - 1.3civil status
    - 1.4) highest educational attainment
    - 1.5 number of years in the servicee
    - 1.6. seminars/workshops attended
2. Assess Science instruction relative to:
    - 2.1 curriculum
    - 2.2materials and facilities
    - 2.3 methods and strategies
    - 2.4 evaluation techniques
3. Determine the differences in the assessments on science instruction when respondents are grouped according to profile variables
4. Identify the managerial potentials of administrators.
5. Compare the assessments of the two groups of respondents and determine significant differences.
6. Discuss the perceived issues and concerns relative to managing Science instruction.
7. Propose a management program.

METHODOLOGY

The study employed the descriptive research design and use a questionnaire as main data gathering tool. Respondents of the study were 117 administrators and 300 Science teachers from the province of Batangas, selected through stratified random sampling.

The study undergone the following: first was the preparation of the questionnaire, and it was validated by experts, then a pilot study was conducted to test the reliability of the questionnaire; the questionnaire was divided into four parts. Part I contained the profile of the teacher-respondents. Part II determined the assessments of administrators and Science teachers on science instruction relative to curriculum, materials and facilities, methods and strategies, and evaluation techniques. Part III covered the managerial potentials of administrators and Part IV gathered data on issues and concerns relative to manage Science instruction; second was the permission to conduct the study from the Schools Division Superintendent in Batangas; third was the distribution and administration of the questionnaire to the target respondents.

Furthermore, the data collected undergo statistical treatment. Statistical tools used to analyze data gathered were frequency count, percentage, weighted mean, independent t-test, and analysis of variance.

RESULTS AND DISCUSSION

From the data gathered, the following findings were obtained.

1. Profile of Administrator and Teacher Respondents

1.1 Age

Table 1
Profile of Respondents in Terms of Age

Age	Administrators		Science Teachers	
	F	%	F	%
56 years old and above	25	21.4	19	21
46-55 years old	37	31.6	52	27
36-45 years old	40	34.2	89	27
26-35 years old	13	11.1	121	27
25 years old and below	2	1.7	7	5.7
Total	**117**	**100**	**300**	**100**

The age brackets among administrators were at the middle age range, and the lowest group was the administrators who were very young in the position.

1.2 Sex

Table 2
Profile of Respondents in Terms of Sex

Sex	Administrators		Science Teachers	
	F	%	F	%
Male	46	39.3	81	27.0
Female	71	60.7	219	73.0
Total	**117**	**100**	**300**	**100**

The administrators were female, and the lowest group was the male administrators. Similarly, among science teachers, the majority of them were females and the least number of science teachers were males.

1.2 Civil status. Administrators were mostly married while least group were widow/separated. Similarly, majority of the Science teachers were also married, and the least number of Science teachers were widow/separated.

Table 3
Profile of Respondents in Terms of Civil Status

Civil Status	Administrators		Science Teachers	
	F	%	F	%
Single	15	12.8	44	14.7
Married	90	76.9	241	80.3
Widow/Separated	12	10.3	14	5.0
Total	**117**	**100**	**300**	**100**

1.4 Highest educational attainment

Table 4
Profile of Respondents in Terms of Highest Educational Attainment

Educational Attainment	Administrators		Science Teachers	
	F	%	F	%
College graduate	0	0.0	45	15.0
With MA units	49	41.9	128	42.7
Master's degree	56	47.9	105	35.0
With Ed.D/Ph.D units	8	6.8	15	5.0
Doctoral degree	4	3.4	7	2.3
Total	**117**	**100**	**300**	**100**

Most of the administrators were master's degree holders, with only four administrators who were doctorate degree holders. For the teachers, majority of them had Masteral units but few of them were doctorate degree holders.

1.5 Number of years in the service.

Table 5
Profile of Respondents in Terms of Number of Years in Service

Number of Years in Service	Administrators		Science Teachers	
	F	%	F	%
5 years and below	0	0.0	62	20.75
6-10 years	5	4.3	68	22.7
11-15 years	1	0.9	61	20.3
16-20 years	23	19.7	40	13.3
21-25 years	37	31.6	40	13.3
26 years and above	51	43.6	29	9.7
Total	**117**	**100**	**300**	**100**

The highest group of administrators comprised of almost half of them served for longer years in the service, while one of them have least number of years in service. Among the teacher respondents, most of them had at most ten-year service, while some of the Science teachers registered 26 years and above teaching services.

1.6 Seminars/workshops attended

Table 6
Profile of Respondents in Terms of Seminars/Workshops Attended

Seminars/workshop attended	Administrators	Science Teachers	VI
	F	F	
11 and above	28	63	Very active
6-10	33	97	Active
5 and below	56	140	Not Active
Total	**117**	**300**	

The data signifies that administrator considered themselves very active in terms of attending seminars, but a larger number of administrators cited they were not active in terms of seminar/workshops attended. Likewise, some of them claimed that they were also very active in attending seminars, but majority, claimed they were not active.

2. Assessment on Science Instruction

The assessment of science instruction between the responses of administrators and Science teachers on the areas of curriculum, materials and facilities, methods and strategies and evaluation techniques were determined in this part of the study.

2.1. Curriculum. The curriculum is considered as the heart of any learning institution. It is the blueprint of the planned interaction of students with instructional content, materials, resources, and process for evaluating the attainment of objectives.

For the administrators, they assessed it was evident that the curriculum was anchored to K to 12 prescribed minimum standards of learning, and it evidently contained concepts which contributed to learning concepts skills and values as reflected by weighted means of 3.15 and 2.77. respectively. This means that from the administrators' point of view, the present curriculum contained vast amount of content knowledge application of knowledge in solving problems band values integration applicable to daily activities. Their assessment also implies that aside from concepts, this new curriculum prepared students to new skills that could be applied and functionally used in their respective communities. This finding confirms the ideas presented by Schwartz (2016), that curriculum for understanding provides ample opportunities for students to apply their knowledge in a variety of context and condition.

For teacher respondent's curriculum was assessed evidently flexible and progressive that allowed changes to bring about improvement as reflected in a weighted mean of 3.17 and provided sufficient time for mastery of concepts and skills as reflected by a weighted of 2.88. This maybe because for the teachers, the time allotted in Science was insufficient in delivering Science instruction hindering them to give deeper explanation of the lesson.

2.2. Materials and facilities. Materials and facilities are important for the successful delivery of Science instruction. The assessments on Science instruction relative to materials and facilities.

For administrators and Science teachers, regular maintenance of materials and facilities was evident in Science instruction as reflected by weighted means of 2.91. The Science laboratory had adequate number of tables and chairs but had lowest weighted mean of 2.00. Moreover, for Science teachers, it was evident Science laboratories were equipped and managed by laboratory technician as reflected in weighted mean of 2.19. This is because there are utility persons or helpers for proper maintenance of the materials and facilities of the school. Also there are assigned facilities/laboratory coordinator for proper monitoring and checking of the materials used in the delivery of Science instruction. The believed there is a need for laboratory technician expert in the field.

2.3. Methods and strategies. Science teachers need to use different methods and strategies in teaching the subject. Students learn the subject-matter when they are taught with methods and approaches responsive to their learning styles. The assessments of the respondents on Science instruction relative to methods and strategies.

For administrators, application of localization and improvisation of Science materials and stimulating students to think scientifically were evident method and strategies in Science instruction as reflected in weighted means of 3.09 and 2.80. This is based on DepEd Order no.35 series of 2016 which promotes the localization and improvisation of Science materials. This maybe most of the methods used by the Science teachers are experimentation and Science investigatory project (SIP) that require them to think scientifically.

For the teachers, the evident methods and strategies in Science instruction were introduction of spiral progression and utilization of laboratory and demonstration methods in Science instruction illustrated in weighted means of 3.15 and 2. 83. This means that the secondary Science teachers integrated spiral progression approach in the four areas of Science, Earth Science, Biology, Chemistry, and Physics. As explained, spiral progression in Science instruction helps the students to master the concepts in different Science lesson.

2.4 Evaluation techniques. These play an important role in determining how effective the Science instruction was. The assessments of the administrators and Science teachers on instruction relative to use of evaluation technique.

For administrators, monitoring students' progress were evident evaluation techniques as reflected by weighted mean of 3.15. Monitoring students' progress is one important part of the learning process. The administrators believe that the performance of the students should be properly monitored. Data further show that it was also evident that evaluation techniques challenged the students to perform better in class with a weighted mean of 2.90. This validates that assessing students' performance inspires the students to do their task effectively. It is a great challenge for them to obtain highest grade on their everyday activities.

For the teacher-respondents, it was also evident that the evaluation techniques tested the effectiveness of the teaching learning process and as reflected by weighted mean of 3.06. Results signifies that assessment test results determine the effectiveness of instruction. Likewise, it also determines strength or even gaps in instruction. The effectiveness of Science instruction is reflected in the students' achievement. In the insights of Keeley (2015), Science teachers should utilize different assessment methods in measuring the effectiveness of science instruction.

3. Differences in the Assessments on Science Instruction when Grouped according to Profile Variables

Age. This is one of the factors which may affect Science instruction assessment. Differences in the assessments of Science instruction when grouped according to age are presented in Table 7.

Table 7
Differences in the Assessments on Science Instruction When Grouped According to Age

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.030	2.750*
Materials and Facilities	0.240	1.388
Methods and Strategies	0.250	1.355
Evaluation Technique	0.002	4.425*

*Significant (Reject Ho)

Table 11 exhibits there were significant differences on the assessment of teachers on Science instruction relative to curriculum and evaluation techniques area values, which were less than 0.05 level of significance. Thus, the null hypothesis was rejected. Data obtained signify that respondents' assessments in curriculum and evaluation techniques in Science instruction varied.

Sex. This is one of the factors which may affect Science instruction assessment. Difference in the assessments on Science instruction when grouped according to sex is presented in Table 8.

Table 8
Differences in the Assessments on Science Instruction When Grouped According to Sex

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.960	-0.053
Materials and Facilities	0.020	2.360*
Methods and Strategies	0.430	0.792
Evaluation Technique	0.295	1.049

*Significant (Reject Ho)

The table highlights those assessments differed among teachers in the areas of materials and facilities as grouped according to sex as reflected in computed t- value and p-value which was less than 0.05 level of significance.

Civil status. This is another factor which may affect Science instruction assessment. Differences in the assessments of Science instruction when grouped according to civil status are presented in Table 9.

Table 9
Differences in the Assessments on Science Instruction When Grouped According to Civil Status

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.479	0.829
Materials and Facilities	0.279	1.288
Methods and Strategies	0.018	3.417*
Evaluation Technique	0.130	1.898

*Significant (Reject Ho)

Table 9 shows that there were no significant differences on the assessments of Science instruction on the areas of curriculum, materials and facilities and evaluation technique when grouped according to civil status as reflected in computed F- values 0.829, 1.288,1.898 with corresponding p- values 0.479, 0.279 and 0.130 which were greater than 0.05 level of significance.

Highest educational attainment. This is another factor which may affect Science instruction assessment. Differences in the assessment of Science instruction when grouped according to highest educational attainment are presented in Table 10.

Table 10
Differences in the Assessments on Science Instruction When Grouped According to Highest Educational Attainment

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.248	1.360
Materials and Facilities	0.224	1.430
Methods and Strategies	0.165	1.638
Evaluation Technique	0.343	1.128

*Significant (Reject Ho)

Science teachers' assessment showed no significant differences in all areas of Science instruction when grouped according to highest educational attainment. This was evident in computed F–values 1.360, 1.430, 1.638 and 1.128 and corresponding p– values of 0.248, 0.224, 0.165 and 0.343 which were greater than 0.05 level of significance. Thus, the null hypothesis was not rejected.

Number of years in service. This may also affect Science instruction assessment. Differences in the assessment of Science instruction when the teachers are grouped according to number of years in service are presented in Table 11.

Table 11
Differences in the Assessments on Science Instruction When Grouped according to Number of Years in Service

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.100	1.864
Materials and Facilities	0.492	0.884
Methods and Strategies	0.997	0.069
Evaluation Technique	0.791	0.480

*Significant (Reject Ho)

There were no significant differences on the assessments of Science teachers on Science instruction in all variables when they are grouped according to number of years in service as reflected by the computed F-values and p-values which are greater than 0.05 level of significance. Thus, the null hypothesis was accepted.

Seminars/workshops attended. These were also cited to have effect to Science instruction assessment. Differences in the assessments of Science instruction when the teachers are grouped according to seminars/workshops attended are presented in Table 12.

Table 12
Differences in the Assessments on Science Instruction When Grouped according to Seminars/workshops Attended

Variables	Teachers	
	p-values	Computed F- values
Curriculum	0.100	1.442
Materials and Facilities	0.190	1.281
Methods and Strategies	0.310	1.134
Evaluation Technique	0.043	1.639

*Significant (Reject Ho)

It could be noted from the computed F-values and p–values which were greater than 0.05 level of significance indicates that there were no significant differences in the teachers' assessments in all areas when grouped according to seminar and workshops attended.

4. Managerial Potentials of Administrators

The potential of administrators in managing instruction may contribute to the success of the organization depending on the subordinates' positive interaction.

The administrators manifested managerial potentials are they extended professional and technical assistance to teachers, encouraged teachers' creativity and resourcefulness and devised ways and means in updating the teachers' needed resources as assessed by the teachers and administrators themselves as reflected by weighted means of 3.29 and 3.18 respectively. This infers that administrators performed their functions of providing technical and professional assistance to teachers which is one of the major roles of the administrator. It only implies that administrators adhered to their sworn responsibilities which include such as assessing teaching methods and monitoring student achievement. They likewise checked and monitored the process of delivering Science instruction as part of their administrative and supervisory functions.

5. Comparison in the Assessments on Managerial Potential of the two groups of respondents

The difference between the responses of administrators and Science teachers regarding the managerial potentials of the administrators is presented in Table 13.

Table 13
Comparison in the Assessment of Administrators and Teachers on Administrators' Managerial Potential

Variables	Mean	p-values	Computed t-values	Decision on Ho	V.i.
Managerial Potential	A-3.11 T-3.04	0.163	1.397	Failed to Reject	Not Significant

There was no significant difference between the assessment of teachers and administrators themselves in terms of administrators' managerial potential, as reflected by the p-value and the level of significance. This indicates that the null hypothesis was not rejected. The two groups of respondents did not differ on their assessment on the managerial potential of administrators. It only shows that the administrators themselves and the Science teachers had the same assessment that they extended professional and technical assistance to teachers, encourage teachers' creativity and resourcefulness, and creating a positive environment to attain harmonious relationships between them and teachers.

5. Issues and Concerns Relative to Managing Science Instruction

There are some issues and concerns relative to managing Science instruction. Identification of the issues and concerns will be of great help for the administrators to address them

at the early stage so that they will not cause conflicts in the delivery of instruction.

Respondents agreed that sufficiency of laboratory equipment was the primary issue in managing Science instruction as shown in weighted mean of 2.79 . Results imply that there is insufficient laboratory equipment in the Division of Batangas. For teachers, laboratory equipment is very necessary in Science especially in conduct of experiments. However, Science teachers shared that they found some ways to provide some improvised materials in case that the needed materials were not available. Laboratory experiences may help students to understand the values and assumptions inherent in the development and interpretation of scientific knowledge. This is in line with the study of Muhamad (2017), that basic Science resources were not available for teaching in most schools

On the other hand, the respondents strongly disagreed on the issues concerning the availability of Science laboratory room, adequacy of learning resources and organization of programs and projects for holistic development of Science instruction. It only implies that there were available books, laboratory manuals which facilitated the accomplishment of programs and projects of 1.07. which got a weighted mean. From the interview conducted, the respondents emphasized that this was not their major concern since their administrators provided teachers schedule of conducting laboratory work; thus, Science teachers had a chance to deliver instruction through laboratory method.

7. Management Program

The proposed management program was primarily designed to guide administrators and teachers in revitalizing Science instruction. Suggested activities and strategies to address the important areas in managing Science instruction such as curriculum, materials and facilities, methods and strategies and evaluation techniques were provided. It focused on aspects where Science instruction were found to be weak and must be given prime consideration.

CONCLUSIONS

In the light of the foregoing findings, the following conclusions are drawn.

1. Most of the teacher and administrator respondents are professionally upgraded in their educational field and have considerable years of teaching experience. Both groups, however, need more professional enhancement via attendance to seminar and trainings.

2. Science instruction in the Division of Batangas is well-managed particularly in curriculum, methods and strategies and evaluation techniques; however, there are inadequacies in materials and
facilities area.

3. Teachers concur on their assessments on Science instruction when grouped according to seminars attended and number of years in the service; but some differences are found in their assessments when categorized as to age, sex, civil status, and highest educational attainment.

4. Administrators in the Division of Batangas have capability in managing Science instruction and are equipped with different skills and techniques in handling managerial functions.

5. Administrators and Science teachers commonly affirm that the administrators have managerial potentials in supervising Science instruction.

6. Sufficiency of laboratory equipment, availability of Science laboratory room, and adequacy of learning resources are the issues in managing Science instruction.

7. The proposed management program provides specific activities and strategies that may help revitalize Science instruction.

RECOMMENDATIONS

Based on the findings and conclusions drawn from the collected data, the researcher recommends the following:

1.The proposed management program may be shown to Science supervisors and other DepEd authorities for their suggestions and enhancement after which it may be suggested for implementation.

2. Administrators may revisit Science instruction particularly the materials and facilities areas to effectively address issues affecting the delivery of Science instruction.

3.A further study may be conducted tracing the effectiveness of the proposed activities on management development program.

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AUTHORS' PROFILE

Marites R. Macasiab, Ed.D is a Science Department Head at San Pedro National High School. A former Part Time Lecturer at Batangas State University, Malvar Campus, taught Science subjects. She is a School Based Management coordinator, School Research coordinator, School YES-O coordinator and former District Science coordinator. She earned her Master's Degree major in Administration and Supervision at Tanauan Institute and obtained the BSEd- General

Science and Doctor of Education, major in Educational Management at Batangas State University, Batangas City.

Norrie E. Gayeta, Ph.D obtained the BSEd-General Science and MAEd-Science Teaching degrees at Batangas State University in 1997 and 2001, respectively. She finished her Doctor of Philosophy in Science Education at Centro Escolar University in the year 2017. She taught Chemistry subjects at Public Secondary School for 10 years and 15 years at Batangas State University. At present, she is a Science professor of the Batangas State University, College of Teacher Education, Undergraduate and Graduate programs. She also served as Department Chairs and Associate Dean of the said College. Currently, she is the Head of Quality Assurance Management of the same University.

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