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MATHEMATICS TEACHERS PERCEPTUAL EXPERIENCES ON CAUSES AND POSSIBLE SOLUTIONS TO LEARNERS' INNUMERACY

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ABSTRACT

Mathematics teachers are the front liners in delivering quality and effective mathematics education among learners. However, despite of all efforts, the trend in learners' innumeracy continues to grow. This study investigated the secondary mathematics teachers' perceptual experiences on causes and possible solutions to learners' innumeracy. A qualitative-narrative research methodology was used. Online interview and online focus group discussion were conducted to gather data. Three online interview sessions were carried out with ten secondary mathematics teachers who have been teaching secondary mathematics for more than 5 years. Following this, three sessions of virtual focus group discussion were conducted. Online interview and focus group discussions were guided by open-ended questions on perceptual experiences of mathematics teachers. Data gathered were transcribed, coded, and triangulated. Thematic analysis was used to identify, analyze, and interpret patterns of meaning within the gathered data. Results indicated that common causes of learners' innumeracy were "learners' negative experiences in math," "learners' negative perception about math," "learners are learning just to pass," "math teachers being ignorant of learners' learning needs," "math teachers use inappropriate instructional materials," "math teachers inadequacy to develop learners' information literacy." Moreover, possible solutions for learners' innumeracy were "creation and offering of realistic mathematics literacy program to the community," "implement different game-based learning experiences," "conduct diagnosis on learners' learning difficulties in math," "provide individual/differentiated supplementary learning materials," "involve parents in learners' learning experience." In conclusion, learners' innumeracy is greatly influenced by their negative behaviors towards math. Realistic, interactive, and supportive environment were seen as possible solutions. It is recommended that the Department of Education should conduct periodic monitoring on mathematics curriculum implementation, and evaluation on the appropriateness of teaching strategies, learning materials and classroom management. Furthermore, mathematics teachers should be equipped on the preparation and integration of differentiated instruction. Active and holistic interaction between mathematics teachers and learners shall be given more emphasis.

Keywords: causes, learners' innumeracy, mathematics teachers, perceptual experiences, solutions

INTRODUCTION

Mathematics teachers are alarmed by the increasing percentage of learners who have little or no interest in mathematics as a subject. Mathematics teachers' personal teaching and learning experiences, added to their daily interaction with learners create varied perceptions on the reasons behind learners' innumeracy. These perceptual experiences also enlighten mathematics teachers on how this learners' innumeracy may be dealt.

Reflecting on the international mathematics

education standards that set to produce functional literate graduates in every continent of the world. This pose a huge challenge to every mathematics teacher who simply rely on their own personal perceptions on the matter, as learners' innumeracy remains a blazing problem globally (Treffers, 1991), and in the Philippines specifically.

Paulos(2019) perceived that leading causes of innumeracy are poor education, misconceptions about math, and psychological blocks. Klinger (2011) conducted a separate study and confirmed that learners with pervasive and frequently severe

negative attitude, low mathematics self-efficacy beliefs, and extreme anxiety of mathematics tend to avoid math. Moreover, Paulos (1989) emphasized that, the deeper source of innumeracy is the prevailing cultural attitudes, misconceptions about the nature of mathematics. Cundiff (2016), added that many teachers lack sufficient knowledge and interest in mathematics.

On the aspect of addressing learners' innumeracy, several researches had been conducted and published for widest dissemination. One example is the study of Cundiff (2016) that emphasized on addressing romantic misconceptions associated with the nature of mathematics. While Barnes (2021) put the role of parents on spotlight as the key players in learners' fight over innumeracy.

Mathematics teachers are the front liners in delivering quality and effective mathematics education. Each mathematics teacher has unique perceptual experience on what's going with learners. According to Gregory (1970), perceptual experience is based on prior knowledge. Mathematics teachers who have been teaching for a number of years are actively constructing perception of reality based on environment and previous direct and indirect experiences. Thus, these experiences inform mathematics teachers' actions towards addressing learners' innumeracy. Hence, this study was conducted to determine mathematics teachers' perceptual experiences on causes and possible solutions to learners' innumeracy.

STATEMENT OF THE PROBLEM/ OBJECTIVES

1. This study was guided by the following research questions:
2. What are the participants' perceptual experiences on causes of learners' innumeracy?
3. What are the participants' perceptual experiences on possible solutions to learners' innumeracy?

METHODOLOGY

This study adopted the narrative research methodology to know the participants' perceptual experiences on causes and possible solutions to learners' innumeracy. Narrative research is elicited and analyzed stories in order to understand people, cultures, and societies (Agosto & Wolgemuth, 2019). It is increasingly used in studies of educa-

tional practice and experience, mainly because teachers are storytellers who individually and socially lead storied lives (Connelly & Clandinin, 1990) that serve as living proof and bases for more engaging mathematics learning experiences.

The epistemological stance considered interpretivism that gave a clear perspective to the researcher for the data collection and interpretation. In this study, the researcher took into consideration the ten Secondary Mathematics teachers' perceptual experiences in terms of causes and possible solutions of learners' innumeracy, investigated and explored and made sense of it.

Participants and Research Setting

The study participants were the ten Secondary School teachers, with at least five years teaching experience in Secondary Mathematics. The researcher together with the participants met online following the agreed schedule of interview and focus group discussion.

Table 1. Ten Mathematics Teachers as Research Participants

No.	Code Name	Number of Years in Teaching Secondary Mathematics
1.	Teacher M.A.	6 years
2.	Teacher R	8 years
3.	Teacher J	5 years
4.	Teacher C	12 years
5.	Teacher E	7 years
6.	Teacher S	5 years
7.	Teacher L	11 years
8.	Teacher Cy	5 years
9.	Teacher B	18 years
10.	Teacher RI	8 years

Data Sources

In qualitative research, data gathering is the precise, systematic gathering of information relevant to the research sub-problems, using interviews, participant observation, focus group discussion, narratives, and case histories (Burns & Grove, 2003). Data collection begins with the researcher deciding where and from whom data will be collected (Talbot, 1995). Furthermore, the researcher is the leading research tool or primary instrument (Streubert, & Carpenter, 2003). The data collection is reflective to allow the participants to express their experiences. In this study, the raw data collection from participants will commence in the orientation or planning stage. Schedule of online interviews and online focus group discussions were negotiated based on the availability of the participants. Table 2 shows the schedule and methods of data collection.

Table 2. Schedule and Methods of Data Collection

Date	Stages of Data Collection	Data Collection Method	Participants
August 13, 2021	Orientation & Planning Stage	Online Focus Group Discussion	All Participants & the researcher
August 19, 2021	Data Collection	Online Interview	Teacher M.A., Teacher R, Teacher J, Teacher C, Teacher E,
August 23, 2021	Data Collection	Online Interview	Teacher S, Teacher L, Teacher Cy, Teacher B, Teacher Rl
August 26, 2021	Data Collection	Online Focus Group Discussion	All participants were present, except for Teacher Cy and Teacher B
August 28, 2021	Data Collection	Online Interview	Teacher B, Teacher M.A., Teacher Rl, Teacher C, Teacher Cy
August 31, 2021	Data Collection	Online Interview	Teacher R, Teacher J, Teacher E, Teacher L
September 6, 2021	Data Collection	Online Focus Group Discussion	All participants & the researcher
September 10, 2021	Triangulation	Online Individual Discussion	Teacher J, Teacher Cy, Teacher S, Teacher L
September 13, 2021	Triangulation	Online Individual Discussion	Teacher M.A, Teacher R, Teacher B
October 10, 2021	Presentation of Themes	Online Focus Group Discussion	All participants and the researcher

Interview. Initially, interviewers and interviewees are strangers to each other. Interviewees tend to be uncertain, self-conscious, and overly critical. Interviewers are intent on projecting themselves in a way that will evoke the least resistance in the interviewee. As first impressions are usually lasting impressions, the initial encounters determine whether a person will agree to an interview or not. Particulars that attest to the interviewer’s credentials are vital for reassuring interviewees that they are dealing with a bona fide interviewer (De Vos, 2002). In this study, the researcher formulated open-ended interview questions guided by the research questions to gather direct information from the participants.

Focus Group Discussion (FGD). Focus Group Discussion enables a researcher to evaluate ideas

in a group setting. The environment of a focus group is often thought of as a more natural setting for gathering data, and enables researchers to gain additional insights from the dialog and interaction between participants (Abrams & Gaiser, 2017). In this study, online focus group discussion was used in order to validate perceptual ideas common among the participants.

Data Analysis

Qualitative data analysis focuses on data qualities, pattern-seeking, and extraction of meaning from rich, complex sources of narrative or visual data. Words, symbols, metaphors, vignettes, and an entire array of creative linguistics tools or visual displays may be considered. Much effort in qualitative data analysis is directed towards the creation of categories. Moreover, the depth afforded by qualitative research is used for understanding the complexity of practice, exploration of unexpected results and is broadly concerned with finding meaning embedded within rich sources of information (Sage Qualitative Data Analysis, 2014.)

In this study, data gathered from online interviews and online focus group discussion were carefully transcribed for clarity, after which, the data gathered were subjected to a sequence of coding processes to find and mark underlying ideas in the data, where similar kinds of information were grouped in categories, and later presented back to the participants for triangulation. After which, the researcher created a framework of relationship among different categories gathered which served as basis to form one central over-arching theme using thematic analysis.

Ethical Considerations

Winter (1987) outlined several ethical principles that researchers must consider when conducting a qualitative research. All these were strictly observed in the conduct of this study, the participants were briefed on the extent and limitations of their participation, confidentiality, and incentive concerns, all written in the consent form provided. Participants' identities will be taken with confidentiality. The participants can anytime withdraw from participating in the research study and with no liability. The time and venue were determined based on the availability and participants' convenience. All data gathered were presented for conformity and approval of the participants. When the research study was completed, the result was first introduced to the participants.

FINDINGS

Mathematics teachers were probed to discuss their perceptual experiences on causes and possible solutions to learners' innumeracy. A thematic analysis of participants' interview revealed significant themes on their perceptual experiences on the causes of learners' innumeracy, such causes were "learners' dilemma with mathematics", and "inefficiency of mathematics teachers," while thematic analysis on mathematics teachers' perceptual experiences on possible solutions to learners' innumeracy suggested the following: 1). Implement different game-based learning experiences, 2). Introduce realistic mathematics literacy program to the community, 3). Parents involvement in learners' learning experience, 4). Diagnosis of learners' learning difficulties in math, 5). Availability of individual/differentiated supplementary learning materials.

Table 3 shows the Mathematics Teachers Perceptual Experiences on Causes of Learners' Innumeracy.

Table 4 shows the Mathematics Teachers Perceptual Experiences on Possible Solutions to Learners' Innumeracy.

Table 3. Mathematics Teachers Perceptual Experiences on Causes of Learners' Innumeracy

Category/ Theme
A. Learners' Dilemma with mathematics 1. Learners' negative experiences in math 2. Learners' wrong perception about math 3. Learners are learning just to pass.
B. Inefficiency of Mathematics teachers 1. Math teachers being ignorant of learners' needs 2. Math teachers use wrong instructional materials 3. Math teachers inadequacy to develop information literacy

Table 4. Mathematics Teachers Perceptual Experiences on Possible Solution to Learners' Innumeracy

Category/ Theme
1. Implement different game-based learning experiences 2. Introduce realistic mathematics literacy program to the community 3. Parents involvement in learners' learning experience 4. Diagnosis of learners' learning difficulties in math 5. Availability of individual/differentiated supplementary learning materials

CONCLUSION

The purpose of this study was to determine the mathematics teachers' perceptual experiences on causes and possible solutions to learners' innumeracy. Based on thematic analysis conducted, learners' psychological and behavioral issues, and teachers' inefficiency were the primary causes of innumeracy. While parents active involvement and mathematics teachers proficiency and versatility were perceived as possible solutions. These perceptual experiences of mathematics teachers are important because they help us make sense of ones varied experiences, understanding first hand varied realities on causes of innumeracy and the emplacement of possible solutions.

RECOMMENDATIONS

- A research study on the "specific causes and solutions" to learners' innumeracy should be conducted;
- School administrators should only assign mathematics subject to teachers who are specialized in mathematics;
- School administrators should provide budget for acquisition of instructional materials and teaching aids to supplement the quality of instruction;
- Collaboration among mathematics teachers should be practiced for sharing of expertise;
- Mathematics teachers should learn to be creative and more facilitative than traditional;
- Realistic and appropriate teaching strategies should be used to maximize learning;
- Parents and Teachers Association should be established to create open and harmonious relationships in support to learners' development in mathematics.

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me to go beyond the usual realm of mathematics teaching and learning process. May we continue to aspire for greatness despite all odds. God bless us!

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READINESS OF KINDERGARTEN COMPLETERS IN GRADE ONE MATHEMATICS

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ABSTRACT

Readiness towards Mathematics plays an important role in the teaching and learning processes of Mathematics. In South City Central School, Toledo City Division, defining kindergarten pupils' readiness can be a difficult endeavor. Due to their different pre-kindergarten education experiences and irregular and episodic development, children enter kindergarten with less developed skills, knowledge, and levels of preparedness. The researcher conducted a study of the significant relationship between Kindergarten Completers' level of readiness in Mathematics and their Grade One Mathematics' performance in the First Quarter examination. The purpose of the study was to determine the mathematics level of readiness of Kindergarten Completers and its relationship to the Grade One Mathematics' Performance in South City Central School, Division of Toledo City, School Year 2016-2017. The respondents were the one hundred forty-nine Kindergarten Completers. The study utilized a descriptive-correlation research design in the conduct of the study. There are two data gathering tools used to measure the variables under study. The first is a validated Math Readiness Test adapted from Merinisa Jugasan-Olvido (2012). It consisted of 40 items divided equally among the eight competencies. The second instrument is the First Quarter Math examination of Grade One pupils that has 24 questions. The researcher utilized different methods of measure of central tendency in analyzing the data gathered. Frequency and Simple Percentage and Mean and Standard Deviation was used to determine the distribution of the Kindergarten Completers' level of readiness. Pearson Product Moment Correlation was used to analyze the correlation between the Kindergarten Completers' level of readiness and their performance in Mathematics. Findings showed that there was a significant relationship between Kindergarten Completers' level of readiness in Mathematics and the Grade One Mathematics performance. Moreover, the more ready the learners have acquired the skills to learn Mathematics, the better is their performance in a test. The study recommended remedial sessions for learners who are not ready or got lower scores in Mathematics test. Therefore, continual attention should be directed towards creating, developing, maintaining, and reinforcing positive attitudes through Math differentiated activities like number games, manipulative activities, cooperative learning, and team teaching.

Keywords: Kindergarten completers, Kindergarten completers' readiness, Math readiness skills, least mastered skills, Mathematics performance

INTRODUCTION

It is commonly known that Math is not an easy subject. The study of Math is sometimes hard for other people and who are talented in Math are often treated as though they are quite not normal. Squires (2009) emphasized that Mathematics has importance over and above the application of basic numeracy skills. It is also helpful mean for developing student's logical thinking and improving mental skills. Mathematics also plays a major role in several other scientific fields, such as physics, engineering, and statistics. In this connection, a good attitude towards the subject among students is an important goal of Mathematics education in many jurisdictions. Generally, it is an undeniable observation among Filipino learners that they excel in knowledge acquisition but fare considerably low in lessons requiring higher order thinking skills. This country is evident in the performance of students in national and international surveys on Mathematics and Science competencies. Separate studies on the mathematics performance of Filipino teachers (Philippine Daily Inquirer, 1988 as cited by Ayan, 2007). What used to be in Grade One work is now expected to be learned in kindergarten. This effect does not leave much time for developmentally appropriate activities that help learners gain and understand Mathematical concepts, and it also takes away from the improvement of the love of learning. The way the subject is taught in the kindergarten level affects not only Math achievement and skill development, but also a child's love of learning. However, to understand and enjoy Mathematics, learners must literally reinvent it through their own daily experiences and with number sense ideas. A good Math kindergarten can provide the developmentally appropriate activities necessary to help learners enter kindergarten confident in their abilities and interested in learning more about numbers.

In the same line, Mathematics anxiety is the result of the learner's negative attitude or not so good experience with their Mathematics teachers in previous years. Such an experience can leave the learners believing him or her deficiency in Mathematics skills. This belief results in poor performance, which gives as confirming evidence to the student. This instance is known as the "self-fulfilling prophecy". Mathematics anxiety results in poor performance rather than the reverse. From the International Mathematics Olympiad, it says "Philippines ranked 79th out of 82 countries in 2003 and 80th out of 85 countries in 2004."

Based on the possible maximum points of 225, China got the highest score of 220 points, Vietnam 126, Thailand 9, and the Philippines 16 points (DepEd, 2003)". It is alarming that some Mathematics learners need to master the basic skills in the said subject.

Yet, in South City Central School, Toledo City Division, defining kindergarten pupils' readiness can be a difficult endeavor. Due to their different prekindergarten education experiences and irregular and episodic development, children enter kindergarten with less developed skills, knowledge, and levels of preparedness. Parents and teachers have differing expectations and collaborate for what children should know and be able to do before starting Grade One. Furthermore, discussions of readiness always include how schools can enhance and support children's readiness no matter what their socioeconomic status, home language background, or skill level or even if preschool tie is a playing period but still, they need to be ready for the upcoming math competencies that they should learn. This study addresses the gap of Kindergarten Completers' poor readiness in Grade One Mathematics and how it may be addressed by both internal and external stakeholders.

In South City Central School, it was observed during the Fourth Periodical Test in 2015, out of ten pupils in kindergarten learners, 6 pupils needed more time to understand in their math lessons. The time allotted for the subject is still lacking. The teacher needs more extra time to give more drills to the child. Also, some of them are anxious in this subject. It was shown in their Final Quarterly Test that 45% showed poor mastery in the Math subject. In this foregoing situation, being a kindergarten teacher-researcher, I have the direct concern to determine the readiness of the Kindergarten Completers in Grade One Mathematics in our school to help the teachers see what the difficult things are experienced by the learners.

Thus, the purpose of the study was to determine the mathematics level of readiness of Kindergarten Completers and its relationship to the Grade One Mathematics' Performance in South City Central School, Division of Toledo City, School Year 2016-2017. Moreover, the conduct of this study springboard the improvement the Kindergarten Completers/ Grade One Pupils to receive greater interest and more positive attitudes toward Mathematics. Therefore, continual attention should be directed towards creating, developing, maintaining, and reinforcing positive attitudes in learning Mathematics. Furthermore, the

researcher the knowledge on the status on the readiness and performance of the Kindergarten Completers in Mathematics in the Division of Toledo City which can help the researcher in using the present scenario as bases for future actions and recommendations.

OBJECTIVES

This study aimed to determine the mathematics level of readiness of Kindergarten Completers and its relationship to the Grade One Mathematics' Performance in South City Central School, Division of Toledo City, School Year 2016-2017.

Specifically, it sought to answer the following questions:

1. What is the level of readiness of the Kindergarten Completers in Mathematics on the following learning competencies:
 - 1.1 shapes and position;
 - 1.2 numbers;
 - 1.3 classifying;
 - 1.4 comparing;
 - 1.5 ordering;
 - 1.6 measuring;
 - 1.7 patterning; and
 - 1.8 problem solving?
2. What is the mathematics' performance of the learners in the First Quarter examination?
3. What are the least mastered competencies in Mathematics?
4. Is there a significant relationship between Kindergarten Completers' level of readiness in Mathematics and their Grade One Mathematics' performance in the First Quarter examination?
5. Based on the findings of the study, what remediation or intervention program can be proposed?

REVIEW OF RELATED LITERATURE

Graue (2006) proposed that readiness should be designed as the result of interaction between ready schools, ready family/community supports, and ready children. She argued for ready schools that are receptive, developmental, and inclusive, in addition to being accountable for all children. In the study of Squires (2009) contributed to the specific area of Mathematics readiness in kindergarten. The purpose of surveying teachers was to identify how teachers currently assess their learn-

ers' readiness and whether there is, indeed, a gap in resources available to support Mathematics readiness. "Readiness for learning" has sometimes been thought of as the extent to which a given child possesses the characteristics (skills, knowledge, and/or dispositions) required for success in school. From this point of view, younger children who may not be seen as "ready" for school right away may be more ready if they wait to enter kindergarten until they demonstrate that they have met certain developmental milestones. In contrast, a child's age alone has often been used to determine his or her "readiness for school", under the assumption that age indicates the presence of the characteristics required for success and that schools need to be ready for the children (Scott, 2006). McClelland, Acock, and Morrison (2006) later examined the influence of learning-related skills in kindergarten on academic math and reading success in elementary school. In this study, the math and reading abilities of children rated as having poor learning-related skills were compared to children rated as having high learning-related skills. Findings suggested that learning-related skills such as self-regulation and social competence predicted math and reading achievement between kindergarten and sixth grade. These effects were strongest between kindergarten and second grade but were still significant through sixth grade.

Klein, Starkey, Clements, Sarama, and Iyer (2008) examined the effects of a preschool mathematics curriculum on children's levels of school readiness. Their findings suggest that use of good quality curricula implemented with dedication can lead to higher levels of school readiness in mathematics. Bracken and Fischel (2007) examined the impact of a supporting literacy-based curriculum on Head Start preschoolers' mathematics and literacy achievement and social and behavior skills.

These ideas pushed the researcher to conduct the study to determine the significant relationship between Kindergarten Completers' level of readiness in Mathematics and their Grade One Mathematics' performance.

METHODOLOGY

This chapter presents the methodology of the present undertaking to determine the readiness of the Kindergarten Completers in Grade One Mathematics in South City Central School, Division of Toledo City. It also describes the processes particularly the design, environment, respondents,

instruments, methods of obtaining data, the analysis of the data and ethical considerations that were used to answer the problems of the present

Design

This study utilized a descriptive-correlation research design. Salkind (2010) considered descriptive research as a type that described the characteristics of the present situation. It is focused with conditions or relationships that exist, practices that prevail, beliefs and processes that are going on. In other words, it used quantitative that describe the level of readiness of the Kindergarten Completers in Grade One Mathematics and its relationship to their Mathematics performance in First Quarter Examination. It also depicted the least mastered skills in Mathematics. The participants in this study consisted of one hundred forty-nine (149) Grade One learners in South City Central School, Division of Toledo City School Year 2016-2017. The study utilized stratified random sampling technique that requires the population to be divided into separate groups as male or female. Then, a probability sample is drawn from each group.

This study assessed the relationship between the level of readiness of Kindergarten Completers and the Grade One Math Performance in the First Quarter of the school year 2016-2017. The study took the consideration of finding the learners' scores of each instrument to find out the readiness of the Kindergarten Completers.

Environment

This study was conducted in South City Central School, Division. It is considered one of the biggest schools in Toledo City Division. South City Central School is a carline school. It is situated at D. Macapagal Highway, Poblacion, Toledo City with a land area of 2, 213, 103 square meters. It is 30 meters away from the Toledo City Division office. The school site is donated. The school started its operation in 1918. It is the only public elementary school in the barangay. Most of the pupils are coming from Barangay Poblacion and the neighboring barangays. South City Central School offers complete elementary education including Special Education, Kindergarten Education and Special Science Elementary Curriculum. It is classified as the Central School of the West Toledo District. There are 52 teachers with 1,970 total number of enrolment. The school is managed by an Elementary School Principal II. The environment was chosen by the researcher for the fact she works in South City Central School being

a Kindergarten teacher. The school is considered as the research local due to its proximity and direct access of the researcher.

Participants of the Study

This study considered one hundred forty (149) Grade one learners in South City Central School, Division of Toledo City School Year 2016-2017. The study utilized stratified random sampling technique that requires the population to be divided into separate groups as male or female. Then, a probability sample is drawn from each group.

The inclusion criteria for participants are as follows: that they are Kindergarten Completers in South City Central School in the previous school year 2015-2016, enrolled in Grade One this school year 2016-2017.

Table 1: Distribution of Participants

Section	Learners' Population			Research Population		
	Male	Female	Total	Male	Female	Total
Camia	16	18	34	10	11	21
Orchid	18	18	36	11	11	22
Daisy	18	17	35	11	10	21
Lily	19	15	34	12	9	21
Rose	20	15	35	12	9	21
Vanda	16	18	34	10	11	21
Adelfa	18	18	36	11	11	22
Total	125	119	244	77	72	149

Table 1 shows the total population of 244 Kindergarten completers of South City Central School, S.Y.2016-2017 with a sample size of 149 learners. The sample size was considered using the process of Krejcie and Morgan (1970) in determining the sample size for finite population.

The Krejcie and Morgan table shows that for a population of 240, the sample size is 149, so for the total population of 244, the sample size was 149. This number was distributed in all the seven sections proportionally.

Instrument

This study employed two research instruments to measure the variables under study. The first instrument is a validated Math Readiness Test adapted from Merinisa Jugasan-Olvido (2012). It consisted of 40 items divided equally among the eight competencies. It focused on the Kindergarten Completers' readiness in Grade One

Mathematics. These learning competencies include shapes and position, numbers, classifying, comparing, ordering, measuring, patterning and problem solving.

The second instrument is the First Quarter Math examination of Grade One pupils. It has 24 questions. The test was made by the mathematics teachers and validated by the mathematics coordinator, and Master teachers in the school to determine if the test items were the competencies covered for the First Grading period. Then, it was duly approved by the Education Program Supervisor in Mathematics

Establishing the Validity of the Test Items

A test has validity evidence if one can demonstrate that it measures that it intends to measure (Kubiszyn & Borich, 2007). This test is supposed to determine Mathematics readiness of an incoming Grade One student, this appropriateness of language used, the format, and content were adhered to. There are several ways of deciding whether a test has enough validity evidence, and the content validity evidence was used in this study.

The final 80 test items were submitted to experts for validation and yielded an average pf 4.25 for Mathematics Readiness Test A and 4.29 for Test M based on the factors that can influence validity. Comments, suggestions, and recommendations were adhered upon. The 80 items are valid and acceptable based on the experts' judgments.

Reliability of the Mathematics Readiness Test

Salvia and Ysseldyke (1998) referred internal consistency as reliability for concluding to other test items. He also called it as an alternate form of reliability. Alternate forms of a test are defined as two sets that a) measured the same trait or skill to the same extent, and b) were standardized on the same population. They offered essentially equivalent traits are sometimes called equivalent forms".

This test was tried out three times and Cronbach's Alpha was utilized to determine if the items were reliable. Cronbach alpha is a measure of internal consistency, that is, how closely related as a set of items are as a group. A high value of alpha is often used (along with substantive arguments and possibly other statistical measures) as evidence that the items measure an underlying (or latent) construct.

Table 2: Reliability of the Math Readiness Test (Form A)

AREAS	OVERALL ALPHA
Shapes and Position	0.92
Number	0.92
Classifying	0.92
Comparing	0.91
Ordering	0.90
Measuring	0.92
Patterning	0.91
Problem Solving	0.91
TOTAL	0.93

(Reliable at > .70)

The second instrument is the First Quarter Math examination of Grade One pupils. It has 24 questions. Reliability was obtained by using the test-retest method. The same test was administered again to 50 learners not included in the study. The coefficient of correlation between the two results was 0.86 suggesting that the test was reliable.

Content validity of the test was determined by the test development process. The test was made by the mathematics teachers and validated by the mathematics coordinator, and Master teachers in the school to determine if the test items were skills covered for the First Grading period. The test was duly approved by the Education Program Supervisor in Mathematics.

The test was composed of sixty (60) percent easy questions, thirty (30) percent average test items and ten (10) percent difficult questions. The test was allotted 40 minutes as specified in the unified learning area time allotment for Mathematics One in the K-12 Curriculum.

Data Gathering Procedures

The one hundred forty (149) Grade one learners in South City Central School, Division of Toledo City School Year 2016-2017 were the primary respondents of this research. Before administering the assessments, the researcher first sought a letter of intent addressed to the dean of the graduate school. When the proposal was approved by the UV IRB the study was submitted to the IRB to be evaluated on the ethical and technical considerations whether the researcher has complied with research conduct protocols. The study was then subjected to corrections and reviews.

Upon approval of the IRB, the researcher sent letters of intent with the research proposal for the conduct of the study to the Toledo City Division Schools Superintendent asking permission to conduct the study in South City Central School. His approval was attached to the letter sent to the

principal of South City Central School. An approval for the conduct of the survey was secured from the school head. With the approval, she asked the first-grade teachers for their willingness to assist her in the schedule of the administration of the Math readiness test and to share the results of the First Periodical test. In addition, assent forms were sought for the Kindergarten Completers who were the respondents after they were explained regarding their voluntary participation, understanding and their contribution to the present undertaking.

The administration of the assessment on the level of readiness of kindergarten completers was done on the second week of February of the school year 2016-2017. The test lasted for an hour. Subsequently, the administration of the assessment on the performance of Kindergarten Completers in Mathematics was administered on August 25, 2016, as a unified schedule provided in the DepEd School Calendar of Activities for School Year 2016-2017. The Math performance of Kindergarten Completers was allotted 40 minutes as specified in the unified learning area time allotment for Mathematics One in the K-12 Curriculum.

Subsequently, the researcher administered the tool personally so that questions were entertained and items which were not clear with the participants were explained to ensure cooperation throughout the study. After the questionnaires were administered to the participants, the researcher personally retrieves them and thanking them for the cooperation extended by the participants for this study. Result of both the assessment level readiness of kindergarten completers as well as the assessment for performance of kindergarten completers were collated, tallied, and subjected to statistical analysis for further interpretation of data.

Data Analysis

Data collected from the assessment level readiness of kindergarten completers as well as the assessment for performance of kindergarten completers were tabulated automatically. Frequency and Simple Percentage was used to determine the distribution of the Kindergarten Completers' level of readiness in Mathematics in South City Central School, Division of Toledo City. Mean and Standard Deviation was used to determine the learner's level of readiness in Mathematics. Pearson Product Moment Correlation was used to analyze the correlation between the Kindergarten Completers' level of readiness

and their performance in Mathematics.

The following questions guided the analysis of the data:

1. What is the level of readiness of the Kindergarten Completers in Mathematics with respect to the targeted 8 competencies.

This question was analyzed using frequency and simple percentage calculation as well as the mean and standard deviation process. By getting the correct responses and frequency of errors with its corresponding percentages.

2. What is the mathematics' performance of the learners in the First Quarter examination?

This question was analyzed using the result of the assessment on the performance of Kindergarten Completers in Mathematics which was administered on August 25, 2016. The researcher utilized the measure of central tendency by looking at the respondents score distribution per item and calculating the mean and standard deviation.

3. What are the least mastered competencies in Mathematics?

This question was analyzed using the assessment level readiness test administered to kindergarten. Students' responses were organized based on the least mastered skills of Grade One pupils in Mathematics as determined by ranking the items 1-40 with the greatest number of errors as the most difficult competency. Using the difficulty indices, the top ten learning competencies that are least mastered by the Grade One pupils in Mathematics was obtained.

4. Is there a significant relationship between Kindergarten Completers' level of readiness in Mathematics and their Grade One Mathematics' performance in the First Quarter examination?

A holistic analysis of both assessment level readiness of kindergarten completers as well as the assessment for performance of kindergarten completers is used to answer and analyze the above question. Pearson Product Moment Correlation was used to analyze the correlation between the Kindergarten Completers' level of readiness and their performance in Mathematics.

5. Based on the findings of the study, what remediation or intervention program can be pro-

posed?

Remediation and intervention programs were proposed based on the overall result and analysis of the student's assessment level readiness of kindergarten completers as well as the assessment for performance of kindergarten completers.

ETHICAL CONSIDERATIONS

The researcher by virtue of the guidelines prescribed by the university shall fully comply all required in the conduct of the study. Before the study will be carried out, the project underwent ethical review and approval by the institutional Review Board which is the ethics committee of the university. Ethical Considerations can be specified as one of the most important parts of the research. Written consent of the parents will be sought by the researcher patterned on that of UVIRB's Informed Consent Form.

Risk-Benefit Assessment

The researcher and the respondents including their parents are the primary beneficiaries of this study. The researcher will gain better understanding on the readiness of the kindergarten completers in Math as well as in their performance in Math in Grade I. Thus, appropriate interventions can be applied. The respondents will benefit because they will receive appropriate interventions as to the competency/ies that they need to master. The parents will also be benefited because they will gain better understanding of the readiness of their children in Math I, thus, they can give appropriate help at home.

There is minimal risk in the conduct of the study specifically in time consumed in answering the questionnaire. The researcher guaranteed the participants that this study will not frame part of an individual assessment; that the responses might be taken as an assembled reaction to answer the questions posted in this study. Should the researcher watches indications of inconvenience that will come about because of the time devoured in answering the questions, the study will be stopped for some time until such time that the participant feels better and be prepared to answer again the survey questionnaire. No vow or guarantee will be made to the participants on any personal gain or advantage that they could get from taking part in this study. However, the potential result is an advocacy program can be created about angels.

Content, Comprehension, and documentation of Informed Consent

Participant Status. A letter was sent to the parents. The parents as well as the participants were then informed of the scheduled filling-up of questionnaire. They were also informed of the criteria set for choosing them as participants purposely for the study. The first thing done was respecting the Kindergarten Completers who took part of this study. The researcher vows for the humane treatment especially those grade pupils with diminished mobility and autonomy. Those that have questioned lucid status were not included in this study and all other vulnerable groups were accorded with utmost protection. This study purposively selected 149 Kindergarten Completers in South City Central School.

Study Goals. The purpose of this research was to determine the Kindergarten Completers' level of readiness in Mathematics Grade I in South City Central School, School Year 2016-2017. Findings of the study served as basis for a proposed remediation/intervention.

Type of Data. The quantitative data for this research were collected using Math Readiness Test questionnaire on the Kindergarten Completers' level of readiness in Mathematics Grade I in South City Central School, School Year 2016-2017.

Procedures. This research undertaking utilized quantitative data analysis. The study utilized survey questionnaires. It was presented, analyzed, and interpreted. Ethical considerations on the process were taken care of by seeking and appending the participants' consent form.

Nature of the Commitment. Among the essential values for research is the integrity of the researcher. This included the commitment to research questions that are designed to contribute to knowledge, a commitment to the pursuit and protection of truth, a commitment to reliance on research methods appropriate to the discipline and honesty. Only that, this took about 30 minutes of the respondents' time to answer the questionnaires related to their background characteristics and the research competencies and productivity. However, they were made to answer the questionnaires at their most convenient time.

Participant's Selection. Respondents were chosen based on the inclusion and exclusion criteria set. No recruitment through advertisement is needed in the study as it is pure answering questionnaires. Parent's assent was applied in the study considering that the informants are all below 18 years old and are therefore not capacitated to give consent.

Potential Risks. There was minimal risk in the conduct of the study specifically in time consumed in answering the questionnaire. The researcher protected all respondents from physical and mental discomfort, harm and danger that may arise from participating in a study. If risks of such consequences exist, the participants should be informed of that fact. Research procedures likely to cause serious or lasting harm will not be used unless the failure to use these procedures might expose them to risk of greater harm, or unless the research has a great potential benefit and fully and voluntary consent is obtained from each informant. In addition, if they feel that some of the questions the researcher asks are stressful or upsetting, if they do not wish to answer a question, they may skip it and go to the next question, or they may stop immediately. If the participants become upset or distressed because of their participation in the research project, the researcher will arrange appropriate support. Any support will be provided by qualified staffs who are not a member of the research team. The counseling will be provided free of charge.

Potential Benefits. The researcher and the respondents including their parents were the primary beneficiaries of this study. The researcher gained better understanding on the readiness of the kindergarten completers in Math as well as in their performance in Math in Grade I. Thus, appropriate interventions can be applied. The respondents benefited because they received appropriate interventions as to the competency/ices that they need to master. The parents were also benefited because they gained better understanding of the readiness of their children in Math I, thus they can give appropriate help at home. The researcher did not guarantee or promise the participants will receive any benefits from this research; however, possible benefits included better understanding on the kindergarten completers' level of readiness in South City Central School, Toledo City Division.

Alternatives. To enable a rational choice about participating in the research study, the par-

ticipants were aware of the full range of options available to them. Consent documents briefly explained any pertinent alternatives to entering the study when appropriate. While this should be more than just a list of alternatives, a full risk/benefit explanation of alternatives may not be appropriate to include in the written document. The person(s) obtaining the participants' consent, however, will be able to discuss available alternatives and answer questions that the participants may raise about them. As with other required elements, the consent document should contain sufficient information to ensure an informed decision.

Confidentiality Pledge. Participants' answered questionnaire was kept with utmost confidentiality. This was stored in a cabinet with lock. The researcher did everything to protect their privacy. Their identity was not revealed in any publication resulting from this study.

Voluntary Consent. Participants' participation in this research was voluntary. They may choose not to participate, and they may withdraw their consent to participate at any time. They will not be penalized in any way should they decide not to participate or to withdraw from this study.

Right to Withdraw and withhold information. The researcher respects the right of any individual to refuse to participate in the study or withdraw from participating at any time. The researcher's obligation in this regard is especially important when he or she is in a position of authority or influence over the informants in a study. Such positions of authority include, but are not limited to, situations in which research participation is required as part of employment or in which the participant is a student, client, or employee of the investigator.

Contact Information. The researcher guaranteed that there are appropriate procedures identified to safeguard the rights of study participants. The UV-IRB Ethics Review Panel reviewed this research and in the event the participants have any questions or concerns inclusive of their rights, grievances, and complaints about this study, they may contact through the UVIRB Officer Marites G. Arcilla at (032) 416 8607 or uvirb2015@gmail.com, at UV Main, Colon St., Cebu City. The researcher will use the ethical principles in research in the conduct of the study especially during the data gathering procedure.

Confidentiality Procedures. The participants' information was held in confidential manner. The participants were assured that the information they disclosed will not be given to anyone else. As a participant, he/she could stop his/her participation once he/she senses that the question is moving toward a personal direction. The study did not entail accessing private information about the participants and thus authorization is not required. Privacy and confidentiality were strictly observed in the conduct of the study. Measures or guarantees to protect privacy and confidentiality of the participant's information as indicated by data collection methods including data protection plans were implemented. To ensuring confidentiality in the study the following measures were afforded: (a) identifying information (i.e. name, address) from informants was obtained when essential; (b) assigning of identification number to each participant and attaching the ID number was done rather than other identifiers to the actual data; (c) maintain identifying information in a locked file; (d) restricting access to identifying information to only a few people on a need-to-know basis; (e) entering no identifying information onto computer files; (f) destroying identifying information as quickly as practical; (g) making research personnel sign confidentiality pledges if they have access to data or identifying information; and (h) reporting research information in the aggregate; if information for an individual is reported, disguise the person's identity, such as through the use of a fictitious name.

Debriefing, Communication and Referrals. Along with being gracious and polite, the researcher phrased questions tactfully. A debriefing was conducted after data collection was completed to permit participants to ask questions or air complaints. Further, after the study, the researcher communicated with the informants to let them know that their participation is appreciated through email. Lastly, referrals were done should research findings deem it proper.

Incentives or Compensation. Compensation was not involved in this research undertaking but the participants were given food or snacks during the administration of the questionnaire.

Conflict of Interest. The researcher disclosed to relevant other parties including the ethics committee, employer, sponsor, and study participants any perceived potential or actual conflict of interest she has in relation to any others involved with

the study. As appropriate to the circumstances, any conflict of interest was avoided. Where this is not practicable, conflicts were minimized and managed, using strategies such as oversight and disclosure. This study is not collaborative in nature, thus, the researcher being the author holds the intellectual property rights as well as the publication rights and information and responsibility sharing. Thus, terms of reference will not be applicable in the study.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

The presentations, analysis and interpretation of the data gathered in determining the level of readiness of the Kindergarten Completers in Mathematics and its relationship to the Grade One Mathematics Performance in South City Central School, Division of Toledo City, school year 2016-2017 as basis for a proposed intervention or remediation program.

The order of presentation starts with the level of readiness of the Kindergarten Completers in Mathematics by learning competencies and then followed with the mathematics readiness of the learners. Third, is the mathematics performance of the learners in the First Quarter examination. Fourth, is to determine the least mastered skills in Mathematics of the learners. Lastly, is the significant relationship between Kindergarten Completers' level of readiness in Mathematics and their Grade One Mathematics' performance in the First Quarter examination.

Mathematics Level of Readiness of Kindergarten Completers by Competencies

Learning competencies refer to the lists of skills to describe education goals. These are also called the abilities and skills a learner should learn in each rating period. Readiness refers to a degree of concentration and eagerness of a child to do a task. Child learns best when they are physically, mentally, and emotionally ready to learn, and do not learn well if they see no reason for learning. The learners are the core of the teaching-learning process; hence, it is the job of the teachers to develop their skills in learning Math. Getting learners ready to learn, developmentally appropriate activities are needed to enhance the skills of each learner. These competencies will not be developed if the learners have not clear objective of the lesson.

The table 1 shows the level of readiness of the Kindergarten Completers in Mathematics of the eight (8) learning competencies: shapes and position, numbers, classifying, comparing, ordering, measuring, patterning and problem solving.

Table 1 Mathematics Readiness of Kindergarten Completers by Learning Competencies

Area	Item Numbers	No. of Items	Mean	% of Achievement	Description
Shapes and Position	1-5	5	4.84	96.80	Ready
Numbers	6-10	5	4.33	86.60	Somewhat Ready
Classifying	11-15	5	4.06	81.20	Somewhat Ready
Comparing	16-20	5	3.67	73.40	Not Ready
Ordering	21-25	5	4.12	82.40	Somewhat Ready
Measuring	26-30	5	3.29	65.80	Not Ready
Patterning	31-35	5	4.70	94.00	Ready
Problem Solving	36-40	5	4.61	92.20	Ready
TOTAL		40	33.62	84.05	Somewhat Ready

Legend for % of Achievement: 88-100 = Ready, 75-87 = Somewhat Ready; 0-74=Not Ready

The results revealed that the learners got the highest level of achievement in Shapes and Position with 96.8 percent, then followed by the learning competency in Patterning which has 94 percent of level of achievement and in Problem Solving with 92.20 percent level of achievement. These three learning competencies were considered the Kindergarten Completers ready.

It means that they have mastered the competencies. The study further showed that the Kindergarten Completers were somewhat ready in the three learning competencies: numbers, classifying and ordering. The learners were not so skillful with these competencies. There is still more time and attention needed to be given to the learners to master the competencies. Moreover, the study confirmed that the Kindergarten Completers were not ready in comparing and measuring. Furthermore, among the eight learning competencies, it is in measuring that the learners got the lowest level percentage of achievement with only 65.8 percent. This implies that the learners have not mastered the competencies. There are still Kindergarten Completers who were not ready for Grade One level. There is a need of great help and attention to be given to these not ready learners. The overall level of readiness of the Kindergarten Completers in Mathematics was somewhat ready.

This means that the readiness of the Kindergarten Completers was not that high or low. It indicated that the readiness of the learners was somewhat and is in an average level.

This would reveal that generally not all the Grade One learners are ready for their mathematics lessons. This means that there are still skills that they have not mastered which are prerequisite for Grade one work. In this case, some of the non-mastered skills must be learned in Grade One level which will make it difficult to cope both for the teachers and the students.

Mathematics Readiness of the Kindergarten Completers

Klein, Starkey, Clements, Sarama, and Iyer (2008) examined the effects of a preschool Mathematics curriculum on learners' levels of readiness. Their findings suggest that use of high-quality curricula implemented with fidelity can lead to higher levels of school readiness in Mathematics.

Readiness for learning means that the learners have the willingness to do the tasks. If one is eager to learn, the results will be that satisfying that leads to a better performance. A good understanding will be determined how each learner reacts during the teaching-learning process. On the other hand, the learners seemed to be not ready if they have not participated in learning activities as required for success in school. The learners that possess good characteristics (skills, knowledge, and dispositions) can surely led to good performance and success in school.

Table 2. Mathematics Readiness of the Kindergarten Completers

Category	F	%	Mean/SD	Overall Description
Ready	35	23.49		
Somewhat Ready	81	54.36	33.62/	Somewhat Ready
Less/Not Ready	33	22.15	2.35	
Total	149	100.00		

Legend for % of Achievement: 88-100 = Ready, 75-87 = Somewhat Ready; 0-74=Not Ready

Table 2 shows the Mathematics Readiness of the Kindergarten Completers. The results revealed that of 149 Kindergarten Completers, 35 learners were considered ready with 23.4 percent. This is a clear manifestation that not even half of the sample population was ready. The study also showed that 81 learners were considered some-

what ready with 54.36 percent. This implies that there were more Kindergarten Completers who needed more attention and time in mastering the competencies. Moreover, there were 33 learners who were not ready with 22.15 percent. This only implies that these learners really need great help from the Grade One teachers in developing the mathematics concepts. Differentiated activities are needed to be done in class to cater the different learning styles of these learners. Therefore, continual attention should be directed towards creating, developing, maintaining, and reinforcing positive attitudes.

Mathematics Performance of the Kindergarten Completers

Cognitive skills were the strongest predictors of school achievement. However, learners' emotional, social, and physical capabilities matter a lot in achieving quality education. The child develops holistically in manner that the different aspects in him will be molded. Mathematics lessons are not easy for others but learning its skills is achievable with a willingness to learn. The mathematics performance is better understood through the readiness shown by the learners by performing the Mathematical tasks.

Table 3. Distribution of the Mathematics Performance of the Kindergarten Completers

Category	F	%	Mean/SD	Overall Description
Above Average	35	23.49	1.87	
Average	79	53.02	20.93/	Average
Below Average	35	23.49	1.87	
Total	149	100.00		

Note: 23-above = Above Average, 20-22 = Average, below-19=Below Average –

The Mathematics Performance of the Kindergarten Completers was tested through the results of the First Quarter examination. The examination consists of 24 item tests with 15 easy questions, 7 average and 2 difficult items. The results revealed that among the 149 learners, 23.49 percent were above average and 53.02 were average and 23.49% were below average. Based on the table, the overall description was average. So, it means that the Math performance of the kindergarten c completers was not so high or low.

Significantly, teaching Mathematics with varied approaches lead to greater interest and developing positive attitudes among the learners.

Item Analysis of Grade One Learners' Mathematics Performance

Item analysis is a process which examines student responses to individual test items (questions) to assess the quality of those items and of the test. It is especially valuable in improving items which will be used again in later tests, but it can also be used to eliminate ambiguous or misleading items in a single test administration. In addition, item analysis is valuable for increasing instructor's skills in emphasis or clarity.

Table 4 presents the difficulty indices of the test items which were classified as easy, average, and difficult. The table shows that of the 24 items, two items were least mastered by the students (item 19 and 20). These were items on ordering sets from least to greatest and vice versa. The students have not mastered sequencing of numbers or may even have difficulty on the concepts of numbers. This could be attributed to their being in Grade One, and this was their first examination.

Table 4. Item Analysis of Grade One Learners' Mathematics Performance

Item Number	Learning Competencies	Difficulty Index	Description	Totality	%
19	ordering sets	40.20	Difficult	2 items are difficult	8.33
20	ordering sets	40.20	Difficult		
11	Counting and telling the number of objects by ones and tens	70.59	Average	7 items are average	29.17
12	Reading number name up to 100 in symbols and in words	69.61	Average		
8	Counting and telling the number of objects by ones and tens	69.61	Average		
7	Counting and telling the number of objects by ones and tens	67.65	Average		
14	Reading number name up to 100 in symbols and in words	65.69	Average		
15	Reading number name up to 100 in symbols and in words	64.71	Average		
10	Counting and telling the number of objects by ones and tens	63.73	Average		

Item Number	Learning Competencies	Difficulty Index	Description	Totality	%
4	Identifying set with zero object	96.08	Easy	15 items are easy	62.5
5	Identifying the number that is one more from given number	93.14	Easy		
16	Comparing two sets	92.16	Easy		
17	Comparing two sets	91.18	Easy		
2	Identifying sets that is lesser than the given set	90.20	Easy		
1	Counting the number of object in a given set	89.22	Easy		
3	Comparing sets	89.22	Easy		
22	Identifying the number that is one more or one less from given number	89.22	Easy		
21	Identifying the number that is one more or one less from given number	89.22	Easy		
23	Identifying the number that is one more or one less from given number	87.25	Easy		
24	Identifying the number that is one more or one less from given number	86.27	Easy		
18	Ordering sets	85.29	Easy		
13	Reading number name up to 100 in symbols and in words	78.43	Easy		
6	Counting and telling the number by ones and tens	76.47	Easy		
9	Counting and telling the number by ones and tens	73.53	Easy		
Average		77.45	Easy		

Legend: 71-100 = Easy, 41-70 = Average, 0-40 = Difficult

There were seven items of average difficulty, meaning that they were not easy or difficult for the Grade One students. Three items were about counting and telling the number of objects in each set by ones and tens while four items were about reading number name up to 100 in symbols and in words. This would mean that there were students who still do not know how to count until 100 nor can tell the number of given objects. These skills are expected during the first grading period or even during the kindergarten level. Although, they constitute only about 30 per cent of the students, yet they should be given attention to master these competencies. Fifteen items were easy for the students, meaning they have mastered these competencies on Counting the number of objects in each set, identifying set that is lesser than the given set, comparing sets using expression “as many as”, Identifying set with zero object, Identifying the number that is one more from given number, and identifying the number that is one more or one less from a given number. Hence, the students have mastered the concept of less and

more objects but not to identify how many objects.

The item analysis revealed also that first periodical test was testing the simple competencies for grade one involving only number concepts. In totality, the test was easy with an average difficulty index of 77.45. However, there were still nine least learned competencies which need to be re-taught.

Correlation between the Learners Mathematics Readiness and their Mathematics Achievement

Correlation between the two variables – Mathematics readiness and Mathematics performance would determine if readiness had something to do with the abilities of the learners in Mathematics. The Pearson r was used to test the hypothesis of no correlation between the two variables.

Table 5 Correlation between the Learners Math Readiness and their Math Performance

Pair of Variables	Mean	STD Deviation	Computed r	P-value	Remarks
ACHIEVEMENT	20.93	1.87	0.683***	0.000	Reject Ho:
READINESS	33.62	2.35			

The table 5 shows that there was a significant relationship between kindergarten Completers’ level of readiness in Mathematics and the Grade One Mathematics performance in the First Quarter examination. This would suggest that learners with better performance in Mathematics test were those who obtain also higher scores in the readiness test. It can be said that the more ready the learners have acquired the skills to learn Mathematics; the better is their performance in a test. On the other hand, those who were not ready obtained lower scores in the mathematics test.

SUMMARY OF FINDINGS

Based on the findings of the study, the results revealed that the learners have high level of achievement in shapes and Position then followed by the learning competency in Patterning the followed by the learning competency in Problem Solving. These three learning competencies were considered that the Kindergarten Completers are ready. It means that they have mastered these skills. The study further showed that the Kindergarten Completers were somewhat ready in the

three learning competencies: Numbers, Classifying and Ordering. The learners were not so skillful with these competencies. Moreover, the study confirmed that the Kindergarten Completers were not ready in Comparing and Measuring. Furthermore, among the 8 learning competencies, it is in Measuring that the learners got the lowest level percentage of achievement. The overall level of readiness of the Kindergarten Completers in Mathematics was somewhat ready.

In Mathematics Performance of the Kindergarten Completers the results revealed that among the 149 learners, 35 were above average, 79 were considered average and 35 were below average. The study further showed that the overall description of the Math performance of the Kindergarten Completers was average. So, it means that the Math performance of the Kindergarten Completers was not so high or low.

In the item analysis of Grade One learners' Mathematics performance that of the 24 items, two items were least mastered by the students (item 19 and 20). These were items on ordering sets from least to greatest and vice versa. The students have not mastered sequencing of numbers or may even have difficulty on the concepts of numbers. This could be attributed to their being in Grade One, and this was their first examination.

There were seven items of average difficulty, meaning that they were not easy or difficult for the Grade One students. Three items were about counting and telling the number of objects in each set by ones and tens while four items were about reading number name up to 100 in symbols and in words. This would mean that there were students who still do not know how to count until 100 nor can tell the number of given objects. These skills are expected during the first grading period or even during the kindergarten level. Although, they constitute only about 30 per cent of the students, yet they should be given attention to master these competencies.

CONCLUSION

Based on the findings of the study, there was a significant relationship between Kindergarten Completers' level of readiness in Mathematics and the Grade One Mathematics performance in the First Quarter examination. This would suggest that learners with better performance in Mathematics test were those who obtain also higher scores in the readiness test. It can be said that the

more ready the learners have acquired the skills to learn Mathematics, the better is their performance in a test. On the other hand, those who were not ready obtained lower scores in the mathematics test.

It is concluded that the more ready the learners have acquired the skills to learn Mathematics, the better is their performance in a test. The findings of this study support the Theory of Readiness by Edward Lee Thorndike as cited by Saul Mcleod (2007) which points out that one learns only when he is physically and mentally ready for it". Individuals learn best when they are ready to learn, and they will not learn much if they see no reason for learning

RECOMMENDATIONS

In the light of the findings the following recommendations are offered:

First, there should be remediation or remedial sessions for learners who are not ready or got lower scores in Mathematics test. The proposed remediation program/schedule should be reviewed and evaluated by the school administrators and be used by the kindergarten teachers to enhance the level of readiness of Kindergarten Completers in Mathematics.

Second, the Kindergarten Completers/ Grade One Pupils should receive greater interest and more positive attitudes toward mathematics. Therefore, continual attention should be directed towards creating, developing, maintaining, and reinforcing positive attitudes through Math differentiated activities like number games, manipulative activities, cooperative learning, and team teaching. This can motivate the learners to perform the tasks with enjoyment and satisfaction that could lead to better learning

Third, the Kindergarten Mathematics teachers as key facilitators in the teaching-learning process should be provided with necessary in-service training and learning resources to help them better incorporate the importance of being skillful in teaching Mathematics to the little learners. Further, they tend to have positive attitudes toward Mathematics and use varied approaches in teaching Mathematics and to be able to deliver effectively quality instructions in Mathematics to the learners.

Fourth, the school administrators should utilize the findings of this study to enhance the level of readiness in Mathematics. They can hold meetings and seminars that focus on developing inter-

est in teaching and learning Mathematics. The teachers and the school administrators should find this study valuable in making work plan for the whole school year of the class focusing learner's learning difficulty. With the knowledge on hand as to the Grade One pupils' performance in Mathematics, they should also know in what way they be assisted or helped through the result of this study particularly on the factors affecting on it and to teacher's same concern as well in the process of teaching the subject.

Fifth, the parents are collaborative partners in school activities. They should also be made aware on scenarios about the level of readiness of their children and be able to access the Remediation Program and establish a consistent study habit for their children at home. Then, the Department of Education should evaluate their programs on teaching Mathematics in Kindergarten to strengthen awareness among learners and teachers alike.

Finally, the following topics are suggested for future research undertakings:

Mathematics Performance of Grades One-Three Using Mother Tongue-Based Education and Remediation: Increased of Mathematics Performance in the Intermediate.

PROPOSED REMEDIATION PROGRAM

Rationale

Remedial programs are intended to close the gap between what a student knows and what he is expected to know. They often target Reading and Math skills. This program is assigned to assist the learners who obtained low scores, and this is to expect to achieve the competencies being failed by the learners. Remedial instruction can help the struggling learners to achieve their basic skills. This can help them to catch up the lessons that have fallen behind. It is very important school activity to help the pupils overcome their learning difficulties.

The remedial teachers should demonstrate varied teaching strategies and approaches to cater the learning styles and abilities of learners. They should practice some teaching objectives which are easy to accomplish to ensure that the learners may acquire the knowledge and skills as expected after the completion of the remedial program. Since the learners have different learning characteristics, teachers design appropriate teaching plans to facilitate learners' effective learning.

Remedial teachers should design meaningful

learning situations, conducive environment, games, or activities to provide personal learning experiences for pupils and stimulate their interest and initiative in learning. Teachers can guide their learners to associate the knowledge they learn from class with their life experiences to improve the effectiveness of learning.

Based on the findings of the present study, there was a significant relationship between Kindergarten Completers' level of readiness in Mathematics and the Grade One Mathematics performance in the First Quarter examination. It can be said that the more ready the learners have acquired the skills to learn Mathematics, the better is their performance in a test. On the other hand, those who were not ready, obtained lower scores in the mathematics test. In this context, a proposed remediation program is formulated. However, the proposed remediation program should be implemented by the teachers.

GENERAL OBJECTIVES

This one-year Remediation Program aims to achieve the following:

1. To give additional help to learners who have not mastered the Math competencies.
2. To provide systematic training to develop the learners' level of readiness in Grade One Mathematics,
3. To design meaningful learning activities for the learners to stimulate the love of learning in Mathematics

Description

The remedial classes are scheduled everyday Monday to Friday after the class hours in the morning and afternoon. It will be done 10:30 to 11:00 in the morning and 4:00 to 4:30 in the afternoon. The remedial program will contain the 5 learning competencies such as about Numbers, Classifying, Ordering, Comparing and Measuring that the learners find them most difficult. This will be held at kindergarten classroom or at E-classroom in the school in order to access the use of the internet or computers for the better understanding of the learners. This will be handled by the remedial Kindergarten teacher. The learners are asked to bring some recycled counters found in their places or in the community like bottle crowns, drinking straws, leaves and many more.

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MAGULANG ANG BIDA: BUILDING PARENT'S INVOLVEMENT IN SCHOOL THRU DEvised AWARDS AND RECOGNITION SYSTEM

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ABSTRACT

Every learning institution yearns for active parent's involvement in school programs and activities since they are one of the key factors in the realization of the school's role in establishing a healthy and successful learning community. This study was conducted to determine the level of participation of parents in terms of school programs, projects and activities (PPAs) here in Taysan Senior High School. It also aims to recognize the barriers and challenges that are frequently encountered by parents while participating in those activities. 'Magulang ang BIDA' (a Filipino term for Parents are the STARS) highlights the devised awards and recognition system for parents to recognize their time and effort for their involvement in school PPAs following the notion of B.F. Skinner in his behavior modification that positive reinforcement increases the probability of a particular behavior that it will occur again. The findings of this study revealed that significant relationships between employment status, number of children studying, distance from home to school and educational attainment and parental involvement in PPAs exist. While age and parental involvement in PPAs was found to be not significantly related. Furthermore, the responses from parents and teachers have no significant difference.

Keywords: Magulang, Bida, Parent's Participation, Involvement, School PPAs, Reinforcement, Awards and Recognition

INTRODUCTION

Parent's involvement plays a vital role in school's improvement as well as learner's progress. Based on several research studies, their active participation in school activities and programs can directly affect a learner's behavior, attendance, and achievement. The collaborative effort between the parents and teachers in carrying out school tasks results in a positive learning environment.

It is a clear vision that every learning institution is eyeing for active parent's involvement in school programs and activities since they are one of the key factors in the realization of the school's role in establishing a healthy and successful learn-

ing community. However, while focusing on this vision, the reality shows that achieving this goal is still a challenge to school personnel. Aside from being busy in their respective jobs and profession, most parents, regardless of their status, have other responsibilities and priorities.

Taysan Senior High School (TSHS), being the newest and the only stand-alone senior high school institution in Taysan District, struggles a lot in reaching out with parents regarding their participation in school activities such as Brigida Eskuwela, school beautifications, orientations, PTA meetings & conferences, and even dialogues regarding their student's behavior and academic performances.

It was with great effort when TSHS launched

its Project I-HEART (Individual Home Engagement and Attitude Records and Tracking of Students) to tap every parent to join in the school's first parenting seminar. This project was being initiated to call-up parents and make them realize that their active involvement really matters not only for their children but also for the sake of the school's accomplishment and achievement. This strategy can be considered as a successful start to tap the parent's attention and emotion but not enough to motivate them and stir their initiative to commit themselves in other activities involving their presence and time in carrying out plans for school improvement.

When COVID-19 pestered the world, another challenge was brought to the educational system and management. It became harder for every institution, particularly in public schools, to reach out with parents and invite them to participate in school programs, projects, and activities (PPAs). The previous challenge was put into another level through a paradigm shift from the old situation to the new normal. Hence, a new approach is needed to overcome the challenges.

Thus, as part of academic institutions, the researchers conducted a study regarding parent's involvement in school PPAs and the challenges they encountered while participating in those activities. Along with these, they propose a new approach highlighting "Magulang ang BIDA" which involves parents to become more active in carrying out school plans, programs, and projects despite their busy schedules. This approach was expected to strengthen parent's support and increase the level of their involvement in school PPAs as playing 'bida or star' of this project.

A. Parent's involvement

Parent's involvement can be generally defined as the parents' or caregivers' investment in the education of their children according to LaRocque et al (2011). In their paper entitled 'Parental Involvement: The Missing Link in School Achievement,' they enumerate various ways on how to demonstrate their adherence to this investment. Some of these may be demonstrated via participation in a hierarchy of activities such as (a) volunteering at school; (b) helping children with their homework; (c) attending school functions; (d) visiting the child's classroom; (e) sharing expertise or experience with the class through guest speaking; and (f) taking on leadership roles in the school and participating in the decision-making process.

Grolnick and Słowiaczek (1994), as men-

tioned in the study of Overstreet et al (2004), differentiated three types of parental involvement in children's schooling: school, cognitive-intellectual, and personal.

The first type of involvement refers to parental participation in activities at school and at home such as attending school activities and assisting with the child's homework. The cognitive-intellectual involvement refers to exposing the child to intellectually stimulating activities, such as reading with the child. The third and the last type of parental involvement includes knowing about what is going on with the child at school, such as knowing what the child is currently working on in school.

Being dubbed as the 'key factor' in school's improvement and progress, parent's involvement in various activities really matters and is considered essential. Their active participation helps every educational institution in promoting a healthy and productive learning environment and more positive academic outcomes.

While this concept is expected to take place, the reality reveals that some parents feel the awkwardness every time they go to school to attend various activities initiated by the institution.

In relation to this, Smrekar & Cohen-Vogel (2009), revealed that "many parents complained that their interactions with teachers were usually negative ones, focused on their children's misbehavior." In their paper entitled *The Voices of Parents: Rethinking the Intersection of Family and School*, they pointed out that communication between school personnel and parents seemed to foster and perpetuate feelings of distrust, distance, and disillusionment among parents every time they are called for a meeting or conference. This complaint might be considered as one of those barriers and challenges that hinder them from involving themselves in school PPAs.

In Wentzel and Wigfield's *Handbook of Motivation at School*, it was stated that parent's involvement is related to the so-called 'self-efficacy' which can influence the choices people make and the courses of action they pursue. Individuals tend to select tasks and activities in which they feel competent and confident and avoid those in which they do not. Unless people believe that their actions will produce the desired consequences, they have little incentives to engage in those actions (2009).

Based on these studies, it shows that parent's actions and decisions toward involvement are affected by their preferences, previous experiences, thoughts and beliefs.

B. Reinforcement for Parent's Involvement

Parents feel, even in the context of parent-attracting policies and gimmicks, that their input and participation is not valued. Indeed, institutional theory suggests that schools may symbolically signal reform under the pressure of attitudinal shifts occurring in the external environment (Smrekar & Cohen-Vogel 2009). The importance of recognition and appreciation on the parent's effort for taking part in school activities was given emphasis.

Wentzel and Wigfield (2009), hypothesized that in a classroom situation many times students engage in activities not because they choose to but rather because the teacher has told them to, because they anticipate rewarding outcomes if they do, and punishment if they do not. Though the focus here is not the parent itself, it may be possible that some or most of them may anticipate any rewards or recognition just like the students, for the time and effort that they invested for parental involvement. The school administration may consider this, to recognize the efforts of parents and encourage them to involve more in school PPAs.

According to Maslow, as cited by Lacanilao (2020), in his free levels of higher-order needs, there is a need for love and belongingness. The need to belong is considered as one of the basic human needs. Parents need to feel that they are being loved by the school administration and their involvement in every PPAs is not a requirement but an engagement. Valuing and appreciating their presence and effort will make them feel a sense of belongingness which may enhance their participation and performance in every school activity.

In B.F. Skinner's behavior modification, he uses two types of reinforcement to increase behavior: positive and negative reinforcement. Positive reinforcement refers to the stimulus added to the environment to increase the probability of that behavior to occur again. In the Encyclopedia of Educational Psychology, positive reinforcement includes any stimulus that often takes the form of verbal praise, tangible rewards or social attention. On the other hand, negative reinforcement increases the behavior by removing something aversive from the situation (Salkind & Rasmussen 2008).

Considering the theory of Skinner, positive reinforcement may be helpful in encouraging parents to engage in PPAs. This may be used by the school administration for parents to highlight their involvement.

According to Cherry (2021), there are many types of positive reinforcers that can be used in a particular situation such as: (a) Natural reinforcers that occur directly as a result of the behavior. An example of this type is when a student performs well in her academics, automatically she will gain an excellent grade. (b) Social reinforcers which involve expressing approval of a behavior. Praises and commendations belong to this type. (c) Tangible reinforcers that involve presenting actual, physical rewards like money, treats, or other desirable objects that can motivate or uplift an individual. (d) Token reinforcers which refers to points or tokens that are awarded for performing certain actions. These tokens can be exchanged for something or value.

STATEMENT OF THE PROBLEM

This study aims to assess parent's involvement in school programs, projects, and activities (PPAs) and to come up with devised awards and recognition systems for parents that will strengthen their participation in school PPAs.

Specifically, the study seeks to answer the following questions:

1. What is the profile of parent-respondents in terms of:
 - 1.1 age;
 - 1.2 employment status;
 - 1.3 number of children studying;
 - 1.4 distance from home to school; and
 - 1.5 educational attainment?
2. To what extent is the level of involvement of parents to the following PPAs, as assessed by teachers and parents, themselves:
 - 2.1 School beautification and maintenance programs
 - 2.2 School activities
 - 2.3 Fund raising projects?
3. Is there a significant relationship between the profile of the parent-respondents and their level of involvement in school's PPAs?
4. How may the assessments by the two groups of respondents compare? Are there significant differences?
5. What are the challenges encountered by parents in participating in various school-related programs, projects and activities?
6. Based on finding, what awards and recognition system may be proposed for parents?

METHODOLOGY

This study measures the level of involvement of parents to school's projects, programs, and activities particularly in Brigada Eskuwela, beautification and enhancement programs (Gulayan sa Paaralan and School Inside A Garden), orientations, meetings and conferences.

To achieve the purpose of this study, the researchers asked for the profile of the respondents and the challenges they have encountered while participating in various school-related programs and activities. This is to determine if there is a significant relationship between their profile and their level of involvement and to understand their reason behind their performance, to come up with the most applicable awards and recognition system for parents as part of the proposed approach in this study.

A. Participants of the Study

This study utilized two groups of respondents. The first group was composed of parents of duly enrolled Grade 12 students in Taysan Senior High School this School Year 2020-2021 while TSHS teachers comprised the second group of respondents.

In the first group of participants, the selection was done through random sampling. The goal was to get a sample of parent-participants to represent the whole population of the said group. Therefore, the selection was made by chance but with a known probability of selection.

Meanwhile, a purposive sampling was applied to the second group of participants. The main criterion for selection using this sampling method is the researcher's judgment that the group somehow represents the population.

B. Data Gathering Method

The study used the descriptive research design in gathering the data and information needed to fulfill this research endeavor. It involved data collection and interpretation in order to gather information needed to serve its purpose. According to Calmorin and Calmorin (2012), the goal of descriptive research is to summarize comprehensively the specific events experienced by individuals or groups of individuals. Since the study will focus on assessing the level of involvement of parents to school-related programs, projects and activities (PPAs) of Taysan Senior High School and the challenges encountered by the parents in participating in various PPAs, the researchers assert that this method is appropriate.

The researcher used self-constructed questionnaires and virtual-unstructured interviews for data collection. The questionnaire is composed of three (3) parts. Part I focused on the profile of parent-respondents in terms of age, employment status, number of children studying, distance from home to school and educational attainment. While Part II was used to assess the level of involvement of parents to PPAs such as Brigada Eskuwela, School Beautification Programs, Orientation Programs and PTA Meetings. Part III covered the challenges encountered by parents in participating in various school-related programs, projects and activities. On the other hand, virtual-unstructured interviews were administered to substantiate the data obtained from the questionnaire.

To establish the validity and reliability, the questionnaire was validated by the English Teacher, Guidance Counselor and Master Teacher. After validation, the researcher prepared a letter of request addressed to the Principal for the administration and distribution of questionnaires in TSHS. Upon the approval and endorsement of the Principal, the researchers administered the questionnaire through online means such as Google Forms and Facebook/ Messenger. The researcher conducted data cleaning to yield more valid and reliable responses from the respondents. After data cleaning, tallying and tabulating, the researchers sought help from a statistician for the treatment of the obtained data.

C. Data Analysis Plan

The following Likert Scale was used to get the scoring of the responses.

Option	Scale	Verbal Interpretation
4	3.26 - 4.00	Frequently Involved/ Encountered
3	2.51 - 3.25	Moderately Involved/ Encountered
2	1.76 - 2.50	Slightly Involved/ Encountered
1	1.00 - 1.75	Least Involved/ Encountered

The statistical tool used in the interpretation of results are as follows:

- **Frequency and Percentage.** This was used to describe the profile of the parent-respondents.
- **Weighted Mean.** This was used to assess the level of involvement of parents to school - related programs, projects and activities (PPAs) of Taysan Senior High School and the challenges encountered by parents in participating in various PPAs.

- **Composite Mean.** This was used to determine the average of the weighted mean obtained from the assessments done by the respondents.
- **Chi-square Test.** This was used to find out if there is a significant relationship between the profile of the parent-respondents and their level of involvement in school's PPAs.
- **t-Test.** This was used to determine the significant differences on the assessment made by the two groups of respondents.

FINDINGS

This part deals with the presentation, analysis and interpretation of data derived from the questionnaires distributed by the researchers to the selected parents and teachers of Taysan Senior High School.

1. Profile of the Parent – Respondent

The respondents of this study were ninety-five (95) selected parents of duly enrolled Grade 12 students of Taysan Senior High School this School Year 2020 - 2021. They were distributed in terms of their age, employment status, number of children studying, distance from home to school and educational attainment.

1.1 Age. The result shows that most of the parent-respondents are below forty (40) years old with a frequency of 35 and percentage of thirty-seven percent (37%). Thirty-five percent (35%) of the parent - respondent has ages ranging from 40 to 50 years old and twenty-five percent (25%) has ages from 50 to 60 years old. Three (3) out of ninety-five (95) parent-respondents are above sixty (60) years old.

1.2 Employment Status. The result reveals that the majority of the parent-respondents are unemployed or not working with a percentage of fifty-two percent (52%). Twenty-two percent (22%) of the parent-respondents are full-time employees while eighteen percent (18%) are part time workers. Only eight percent (8%) are self-employed and doing online business.

1.3 Number of Children Studying. The result indicates that twenty-seven (27) parent-respondents have four (4) children studying this school year 2020-2021. Twenty (20) has two (2) children studying, same with those who have three (3) children at-

tending school this school year. Nineteen (19) parents have five (5) children studying while seven (7) have only one (1) child enrolled this school year. Only two (2) parents have six (6) children studying at the same time.

1.4 Distance from Home to School. Sixty percent (60%) of the respondents live outside the one (1) kilometer radius of the school. On the other side, forty percent (40%) is within 1 kilometer radius.

1.5 Educational Attainment. Majority of the parent-respondents are high school graduates with a percentage of fifty-nine percent (59%). Twenty-one percent (21%) are elementary graduates whilst twelve percent (12%) finished a college degree. Six (6) parent-respondents took vocational courses as two (2) out of 95 were not able to attend school.

2. Assessment in the Level of Involvement of Parents to the School – Related Programs, Projects and Activities (PPAs)

This study determined the level of involvement of parents to the school – related PAPs as assessed by the teachers and parents themselves.

2.1 School Beautification and Maintenance Programs

According to LaRocque et al (2011), one of the ways to demonstrate the involvement of parents in school is by volunteering. As reflected in the assessment of teachers, the majority of the parents were moderately involved in volunteering at school with a weighted mean of 2.72. They were also moderately involved in repainting of fences, chairs and classroom walls and encouraging other parents to participate and engage in Brigada Eskuwela activities. Both have obtained a weighted mean of 2.52. It means that the spirit of volunteerism is witnessed among the parents during the school beautification and maintenance programs. It further indicates that parents volunteered and helped the teachers not only in schoolwork during Brigada Eskuwela but also by persuading other parents to join.

However, parents were slightly involved in sourcing out the needed resources for school improvement like materials and labor with a weighted mean value of 1.88 and rank of 9. They were also slightly involved in the opening and clos-

ing program of Brigada Eskuwela with a weighted mean of 1.76, last on the rank.

As assessed by the parents themselves, they were moderately involved in volunteering at school as evident on the obtained weighted mean of 3.08, ranked 1. They were also moderately involved in the creation of working committee for Brigada Eskuwela (BE), Gulayan sa Paaralan (GPP) and School Inside a Garden (SIGA) and encouraging other parents to participate and engage in BE activities with a weighted mean of 2.89, ranked 2.5. This reveals that most of the parents participated in the planning activities of school programs like BE, GPP and SIGA. Moderate involvement is also perceived to parents in repainting of fences, chairs and classroom walls, ranked 4, and soliciting support from other stakeholders for school improvement, ranked 5, as it obtained a weighted mean of 2.86 and 2.85, respectively.

Likewise, parents were moderately involved in maintaining cleanliness of school and helping in the school waste segregation program by teaching the concept and practice to the child as manifested in its weighted mean of 2.61, ranked 6.5. It implies that some parents contribute to the maintenance of cleanliness and orderliness in school not only through their presence in school but also by practicing proper waste segregation even at their respective homes.

On the other hand, parents were slightly involved in securing the safety and functionality of school facilities and equipment as shown in its weighted mean value of 2.33, ranked 8. Same verbal interpretation is obtained in sourcing out the needed resources for school improvement like materials and labor with a weighted mean of 2.15, ranked 9. Lastly, they were also slightly involved in the opening and closing program of BE as evident in the computed weighted mean of 1.76, ranked 10. This unveils lower involvement of parents in the main program of BE.

In general, based on the assessment of teachers, parents were slightly involved in school beautification and maintenance programs as reflected by its composite mean value of 2.27. However, as assessed by the parents themselves, they were moderately

involved in the afore-mentioned programs as depicted in the computed composite mean value of 2.61.

2.2 School Activities

The responses from the teachers resulted in a composite mean value of 2.60. The highest weighted mean value of 2.84 was observed in attending the general assembly and PTA election. While the lowest weighted mean value was noted in giving the learner's report card and in visiting school or learner's classroom and communicating with the adviser and subject teachers.

Moreover, the responses from the parents resulted in a composite mean value of 2.85. The highest weighted mean value, 2.99, was attained in attending homeroom PTA meetings. While the lowest weighted mean value, 2.82 was posted in giving a learner's report card; attending immersion orientation and other school orientation activities; accompanying children during school programs and school activities; and joining in Parent's Day celebration.

Summarizing the assessment of teachers and parents, parents were moderately involved in school activities.

2.3 Fund Raising Projects

The composite mean value of 2.04 indicates that teachers perceived slight parental involvement in school activities. On one hand, the highest weighted mean value in the assessment done by teachers was 2.56 which is in indicator 8. Parents were moderately involved in promoting fund raising projects by encouraging more parents to support. On the other hand, the lowest weighted mean value was 1.68 which is in indicator 6. Parents were slightly involved in supporting the school canteen.

In addition, the composite mean value of 2.14 denotes that parents, as assessed by themselves, were moderately involved in school activities. The highest weighted mean value in their assessment was 2.79 which is in indicator 8, same with the result of the assessment of teachers. The lowest weighted mean value was 1.81 which is indicator 4. Parents were slightly involved in contributing personal money for school.

Overall, both teachers and parents identified that parents were slightly involved in

the fund raising projects conducted by Taysan Senior High School. This result poses a challenge to the teachers and principal to frequently involve the parents in these projects.

3. Relationship between the Profile of the Parent-Respondents and their Level of Involvement in School – Related Programs, Activities and Projects (PPAs)

This part of the study described the relationship of the profile of the parent-respondents such as age, employment status, number of children studying, distance from home to school and educational attainment and their level of involvement in the school-related programs, projects and activities as perceived by 95 parent-respondents.

3.1 Relationship between the Age of the Parent-Respondents and their Level of Involvement in School – Related Programs, Projects and Activities (PPAs).

Upon application of the Chi-Square test, the researchers failed to reject the null hypothesis since the p-values, 0.919, 0.170 and 0.788, were greater than 0.05. Thus, there is no significant relationship between the age of the parent-respondents and their level of involvement in school-related PPAs. This conforms to the results of the study of Brock and Edmunds (2010). However, such a result contradicts the findings in the study of Overstreet et al (2004) that age is related to school involvement of the parents.

3.2 Relationship between the Employment Status of the Parent-Respondents and their Level of Involvement in School – Related Programs, Projects and Activities (PPAs).

Based on the results, the researchers reject the null hypothesis since the p-values in each school-related PPAs were less than 0.05. Hence, there is a significant relationship between the employment status of the parent-respondents and their level of involvement in school-related PPAs. Such finding is in support of the study of Overstreet et al (2004) which claims that parents with consistent jobs and more favorable views of school responsiveness to parental involvement were more likely to be involved in their children's schooling.

3.3 Relationship between the Number of Children Studying and the Level of Parents Involvement in School – Related Programs, Projects and Activities (PPAs).

In reference to the computed values, the null hypothesis is rejected since the p-values in each school-related PPAs were all less than 0.05. Therefore, there is a significant relationship between the number of children studying and the level of parents involvement in school-related PPAs. The study of Sui-Chu and Willms (1996) stressed that the effects of the number of siblings on school participation of parents were positive and relatively small. This suggests that the number of children studying at the same school year has limited impact on the level of involvement of parents to school-related PPAs.

3.4 Relationship between the Distance from Home to School and the Level of Parents Involvement in School – Related Programs, Projects and Activities (PPAs)

Results showed that there is a significant relationship between the distance from home to school and the level of parents involvement in school beautification and maintenance programs, school activities and fund raising projects as reflected in their p-values of 0.002, 0.0000000002 and 0.007, respectively. Consequently, the distance of the parent's home to school affects their level of participation in school PPAs. It seems that parents whose household is far from school participate less in school PPAs but those who are near in school participate more.

3.5 Relationship between the Educational Attainment of the Parent-Respondents and their Level of Involvement in School – Related Programs, Projects and Activities (PPAs).

Results revealed that there is a significant relationship between the educational attainment of the parent-respondents and their level of involvement in the school-related PPAs. This was evident on the computed p-values which are less than 0.05 in school beautification and maintenance programs, school activities and fundraising projects. It implies that the educational attainment of the parents is related to their participation in school-related PPAs.

According to Overstreet et al (2004), the educational attainment of parents was positively correlated to their employment status. In the same study, it was concluded that employment status was related to the

school involvement of parents, thus, by transitivity, the educational attainment of parents is related to the level of parents involvement in the school-related PPAs.

4. Difference between the Assessment of Parents and Teachers with regards to Parents Involvement in School – Related Programs, Projects and Activities (PPAs).

This part of the study compares the difference between the assessment of parents and teachers with regards to parental involvement in school-related programs, projects and activities (PPAs).

The mean difference of the teachers and parents responses as well as the corresponding t-values were considered in the computation. The result indicates that there is no significant difference in the assessment of parents and teachers with regards to parental involvement in school-related PPAs. This was evident on the obtained p-values on school beautification and maintenance programs, 0.892, school activities, 0.642 and fund raising projects, 0.806 which are all greater than 0.05. Meaning, the assessment of parents and teachers are likely similar to each other.

5. Challenges Encountered by Parents in Participating in Various School-Related Programs, Projects and Activities (PPAs)

The data revealed that the need for child care for other children was frequently encountered by the parent-respondents as it ranked first among the challenges with a weighted mean of 3.41. Second in the rank is time conflict due to work schedules and other personal activities with a weighted mean value of 3.35 and verbally interpreted as frequently encountered. According to Brock and Edmunds (2010), the two most common obstacles to parental involvement were lack of time and conflicts with work schedules. The study further suggests that school administrators and teachers need to thoroughly consider these challenges because it seems that parents want to be involved but are unable to do so.

Third in the rank is not following the advised time for activities with a weighted mean value of 3.32 and verbally interpreted as frequently encountered. Another frequently encountered challenges by the parent are the lack of interest and willingness in participating in school-related activities with a weighted mean value of 3.26, and less valued or unrecognized efforts with a weighted mean value of 3.25 which ranked fourth and fifth. In the paper of Fletke (1997), one of the suggested procedures to promote partnership with

parents is to give recognition to parent volunteers. It may be in the form of special tea prepared by the students and/or a certificate of appreciation given by the school administration.

Among the moderately encountered problems by the parents are the following: miscommunication with teachers and/or school personnel, uncomfortable with teachers, and school personnel, experienced embarrassment from teachers and school personnel, teachers are not approachable and less responsive and hearing negative feedbacks on child's behavior in school with a weighted mean of 2.91 and witnessed negative attitude from teachers with a weighted mean of 2.57.

Moreover, the following challenges occurred to be slightly encountered as it was rated by the parent-respondents: lack of transportation with a weighted mean of 2.35, personal or family problems with a weighted mean of 2.33, age barriers and health conditions with a weighted mean of both 2.24.

Rated as least encountered challenges are lack of trust to teachers and school personnel, parents felt unwelcome in school and lack of sensitivity from the school administration which obtained a weighted mean value of 1.74. Feeling intimidated with other parents is last in the rank having a weighted mean of 1.65.

Summarily, the parents moderately encountered the listed challenges in participating in various school PPAs as evident in the obtained composite mean of 2.64. With this result, teachers and school administrators faced a significant challenge on how to strengthen the bridge between parents and school-related PPAs.

6. Devised Award and Recognition System

In view of the results above, one of the top reasons behind parent's inactive participation is they felt that their efforts were not appreciated or less valued. To alleviate this challenge, this research looked at the concept of Skinner about behavior modification by positive reinforcement. Thus, the researchers proposed an award and recognition scheme to improve the level of involvement of parents to various school programs, projects and activities (PPAs). The proposal, entitled "Magulang ang BIDA", was devised to recognize the valuable contribution and involvement of parents and to encourage other parents to participate in the programs, projects and activities of Taysan Senior High School. This is a great way to recognize those parents who have gone above and beyond in every School Year in the classroom/

school.

CONCLUSIONS

In the light of the results and findings mentioned above, these conclusions were drawn.

1. Most of the parent-respondents are below forty years old, high school graduates, currently unemployed with four children studying this SY 2020-2021, living outside the one kilometer radius of Taysan Senior High School.
2. As rated by the teachers, they were slightly involved in school beautification and maintenance programs and fundraising projects and moderately involved in school activities. Moreover, as rated by themselves, they were moderately involved in school beautification and maintenance programs and school activities and slightly involved in fund raising projects.
3. Their ages were found to have no significant relationship to their involvement in PPAs. While their employment status, number of children studying, distance from home to school and educational attainment were significantly related to their involvement in PPAs.
4. There was no significant difference between the assessment of teachers and parents with regards to the parents' involvement in school-related PPAs.
5. The top five (5) frequently encountered challenges encountered by parents in participating in various school-related PPAs are the following: (1) need of childcare for other children, (2) time conflict due to work schedules and other personal activities, (3) not following the advised time for activities, (4) lack of interest and willingness in participating school related activities (5) less valued or unrecognized efforts.

RECOMMENDATIONS

Relative to the results and findings, the following must be considered:

1. Parents must feel the sense of belongingness and spirit of acceptance within the school to elicit the feelings of being pressured and intimidated. Constant communication with the parents must be practiced by teachers and other school personnel to remind them the importance of their presence and participation in school PPAs. A good and close relation-

ship with parents must be established to be able to achieve the purpose of successful partnership.

2. Teachers, being the key proponent of partnership with parents, should constantly inform them about the upcoming events in school so that parents can prepare ahead of time. They should remind them about their roles not only as parents to their children but also being a stakeholder of the school. A nice and friendly approach is needed for teachers to make every parent feel comfortable.
3. Parents, on the other hand, should ask their children frequently regarding school activities. Like what Lacanilao (2020) said, it will be good to pay a visit once in a while to be updated on the school's programs and activities.
4. Conforms with the old maxim that 'time is gold', teachers and school personnel should practice and observe proper time management. Parents are individuals with accompanying responsibilities at home so every second for them is important. The allotted time for every PPAs must be strictly observed so that they can have the chance to attend other appointments and activities on that particular day.
5. Following Skinner's concept, the researchers highly recommend that parents should be given a reward as commendation to their performance. This is to show appreciation for their valuable contribution and involvement in school activities. The devised system of awards and recognition in this study may be used to show this gesture of appreciation during Parent's Recognition Rites.

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Appendix

MAGULANG ANG BIDA GUIDELINES FOR SELECTING PARENTS AWARDEES

Purpose of the Project

This project was developed to strengthen parent's involvement in school programs, projects, and activities (PPAs). Based on the results of this study entitled "Magulang ang BIDA: Building Parent's Involvement in School Thru Devised Awards and Recognition System," one of the top reasons behind parent's inactive participation is they felt that their efforts were not appreciated or less valued. To work out with this problem, this study considered the concept of B.F. Skinner about behavior modification by using positive reinforcement through this proposed awards and recognition system.

LIST OF AWARDS

- a) **Parent of the Year.** This award is given to a parent(s)/caregiver(s) or legal guardians who have made a significant impact and contribution to the life of a student and supported all curricular activities in school.
- b) **Outstanding Parent of the Year.** This award is given to parents who sustained excellent performance, rendered significant contributions to the school resulting in, for example, more efficiency, better service, cost savings, or successful crisis management.
- c) **Most Valuable Parent.** This award is given to parents who dedicatedly spent their time and effort in school to help their child succeed academically.
- d) **Perfect Attendance.** This award is given to parents who are present in all school PPAs.
- e) **Most Cooperative Parent.** This is awarded to parents who support the school activities by all means (either through monetary or personal).
- f) **Very Important Parent.** This is awarded to parents who always volunteer in every task. This is to recognize the parents and volunteers who give their time to help make the classroom a wonderful place to be and learn.
- g) **Heart of Gold Award.** This award is given to deserving parents for being compassionate and caring to fellow parents, teachers and other school personnel.
- h) **Snickers Award.** This is given to parents who serve as the ice breaker during school events and make others laugh at his/her jokes and witty ideas.
- i) **Chic and Sassy Award.** This is given to parents who observe and practice fashion during formal events. They are also being referred to as Fashionista Parents.
- j) **Most Dedicated Parent's Award.** This is given to parents who dedicate themselves to attending school programs and activities despite their busy schedule. This is to be given to parents who prioritize school events over their jobs.
- k) **Team Spirit Award.** This is given to sets of officers who perform well in school and implement programs and projects that give benefit to students and to the school.
- l) **Most Creative Award.** This is given to parents who contributed nice concepts in school and classroom beautification.
- m) **Resourceful Award.** This is awarded to parents who have the initiative to look for and acquire resources for the implementation of school projects.
- n) **Perfectly Polite Award.** This is given to those who always greet fellow parents, teachers, and other school personnel.
- o) **Most Punctual/ Early Bird Award.** This is given to those who always come to school activities on or before the scheduled time (usually first in the attendance logbook).
- p) **Parent-Leader Award.** This is given to parents who lead fellow parents, usually PTA Officers. This is to encourage every parent to participate in every PTA Election and accept whatever role/position assigned to them.
- q) **Family Oriented Award.** This is given to those couples who always attend school programs with their husband or wife.
- r) **Parent - Messenger Award.** This is given to parents who always keep fellow parents and school personnel updated on current events within the school and community.
- s) **Best Parent - Teacher Tandem Award.** This is awarded to parents and teachers who have shown exceptional performance in every school PPAs through their collaborative efforts.
- t) **Principal's Choice Award.** This award is given to parents who advocate parent's empowerment, a good and effective leader, and upholding academic support to the school. This is usually given to the PTA president.

ELIGIBILITY

All parents or legal guardians whose children are currently enrolled at Taysan Senior High School are eligible for these awards.

AWARD

To recognize the parent's involvement, the recipients for each award will receive a certificate or plaque of recognition as a commendation for their valuable effort. A simple token of appreciation may also be awarded depending on the available resources of the school.

SELECTION PROCESS

- Parents will be nominated or recommended by class advisers since they are the one who closely monitors every parent or guardians in every school activity except for the Parent of the Year Award and the Principal's Choice Award.
- Nominees for the Parent of the Year Award will be recommended by the student. In essay form, students will cite reasons why their parent(s) should be the Parent of the Year. All essays and entries will be judged in strict confidentiality by the Selection Committee. Submissions will be judged solely on their ability to convey the merit of their parent(s)/caregiver(s) or guardian(s) outstanding involvement in their life. On the other hand, the Principal's Choice Award will depend on the choice and distinction of the School Principal.
- The time frame for nomination will be in the first week of the last month of every school year while the selection process will be held every second week of the said month. Awarding and recognition may be held a day after student's recognition or upon the agreed date of the school administration.
- The Selection Committee will consist of Grade 11 & 12 Teacher Representative, Adopt-A-School Coordinator, Guidance Counselor, Master Teacher and School Head.
- Every adviser will be given a nomination form to be filled out and will be submitted to the selection committee on the scheduled date. Alternatively, google forms will be available for online nomination.
- Nominees will be evaluated based on the attachments/supporting documents or records (Ex. Attendance sheets) presented by the school advisers. There is no specific number of recipients for each award. All who qualified the criteria will be recognized.

COMMUNICATION

- The recipients of every award will be notified through a communication letter and a personal call from the in-charged committee.

REVIEW AND UPDATE

- School Administration is encouraged to review the Parents Awards and Recognition programs regularly.

PERCEIVE EFFECTS ON MODULAR LEARNING OF THE GRADE FIVE PUPILS

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ABSTRACT

Face to face learning engagement of pupils and teachers within the school has been suspended due to the COVID-19 pandemic. This pandemic has paved the way to the implementation of Modular Learning as an urgent response to ensure continuity of education (Tria, 2020). The following statistical tools used in the study were mean and Mann Whitey U. The findings of the study revealed when taken as a whole, three prevalent perceived effects of modular learning on pupils were “I learn somehow because of the provided link for videos, “I feel lazy sometimes...” and lastly, “Modular learning allows me to study, learn. As to male respondents, the prevalent perceived effects of modular learning “I learn somehow because of the provided link for videos, as to female respondents “I learn somehow because of the provided link for videos, no significant difference in the perceived effects of modular learning when respondents were grouped as to sex.

Keywords: Perceived, Modular Learning, Effects, Pupils

INTRODUCTION

Face to face learning engagement of pupils and teachers within the school has been suspended due to the COVID-19 pandemic. This pandemic has paved the way to the implementation of Modular Learning as an urgent response to ensure continuity of education.

The teacher takes the responsibility of monitoring the progress of the learners. Since education is no longer held within the school, parents serve as partners of teachers in education. (FlipScience, 2020). In this regard, the teacher has been tasked to prepare the young people to become useful, upright, and active citizens in the community.

On the other hand the teachers have been looking for instructional materials like modules that would be effective in the performance of the learners. For this reason, the researcher was encouraged to determine the perceived effects on modular learning of grade five pupils, A.Y 2021-2022.

With the constructivist approach, the educator becomes a facilitator of learning. For this reason, the responsibility of the educator-facilitator is to

create learning opportunities for students to process new information and link it to existing mental frameworks through individual or social activity.

Learning opportunities are created within a complex system that consists of the educator, student, teaching context, teaching and learning activities, outcomes and student assessment tasks and should take the clinical environment into consideration. Based on the main goal of the study, the following questions will be investigated:

Figure 1 shows the research paradigm use to determine the perceived effect of modular learning to grade five pupils, S.Y 2021-2022

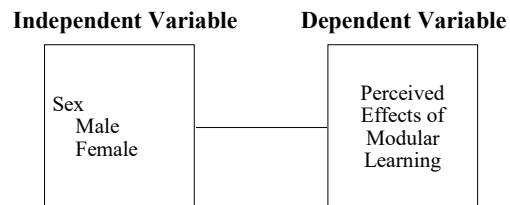


Figure 1. The schematic diagram showing the grade five pupils perceived effects on modular learning

LITERATURE REVIEW

The shift of nearly all teaching settings to a virtual environment has been challenging but may also allow more interaction during teaching sessions than traditional readout sessions or didactic lectures. Changes in learning systems force schools to implement distance education or online learning, e-learning, distance education, modular learning correspondence education, external studies, flexible learning, and massive open online courses (MOOCs).

Padsing (2021), the concept of “module” is strictly linked to the idea of a flexible language curriculum, which should provide all those concerned with education (primarily learners and teachers, but also parents and administrators, as well as society at large) with a framework to establish clear and realistic language learning objectives. Modular instruction is an alternative instructional design that uses developed instructional materials which are based on the needs of the learners in which they engaged themselves in learning concepts presented in the module.

According to the Boise State University (2020), a module can be defined as a unit, chapter, topic, or segment of instruction. It is a standard unit or instructional section of your course that is a “self-contained” chunk of instruction.

As stated by Briones, 2020, “Education Secretary hopes schools will eventually “reduce dependence” on modular learning as the country shifts to distance learning approach during the pandemic.

DepEd said that it has realigned its 2020 budget to fund distance learning, while actual contributions from Special Education Funds (SEF) of local government units and from Brigada Eskwela had considered in the provision of funds to cover learning resources.

Another study made by Daud (2013), here has been significant research in recent years on the effectiveness of Module instruction. Studies have shown that an important aspect of this approach is the enhancement of students' mathematical achievements. This method could help them easily catch on mathematic courses and expressed their view of points. Moreover, it improved learners' interest and positive attitude.

Based on the result, the study of Aksan (2021), revealed that students' perceptions agreed on using modular distance learning approach (MDLA). It means the students had positive perceptions regarding MDLA in Mathematics. The study also revealed that students agreed on using

modular distance learning approach (MDLA) in Math have little challenges. It had also a positive effect to students' performance in which students performed very satisfactory in Mathematics which means they had good quality performance.

The level of achievement of the students taught using modular instruction and lecture-discussion based on the results of the paired t-test between the mean pretest and mean posttest scores of the experimental and control groups suggests that the mean posttest score is significantly higher than the pretest score in both the control group and experimental group. This further emphasized that the pretest and posttest of both the control and experimental groups indicating the median posttest scores in both groups are higher than the median pretest scores.

METHODOLOGY

The main purpose of this study was to determine the perceived effects of modular learning of the pupils of Dacutan Elementary school, Duman-gas, Iloilo, School year 2020 -2021.

The descriptive method of research was used in this study.

The respondents of the study were the 15 grade five pupils of Dacutan Elementary, School year 2020-2021.

The grade five pupils compose of 8 male comprising 53% of the total population and 7 female comprising 46% of the total population.

Table 1. represents the data

Table 1. Distribution of the Respondents

Category	f	%
A. Entire Group	15	100
B. Sex		
Male	8	53.00
Female	7	46.00

The sample size were 15 grade five pupils of Dacutan Elementary School, School year 2020-2021.

Purposive sampling, also known as judgmental, selective, or subjective sampling, is a form of non-probability sampling in which researchers rely on their own judgment when choosing members of the population to participate in their surveys.

There were 15 grade five pupils of Dacutan Elementary School, School year 2020 – 2021, purposive sampling was employed. This study

was performed from August 2021. Pupils were informed beforehand and permission was approved during the conduct of the study. Questionnaire was given at the end of the school.

The questionnaire checklist was used to assess the perceived effects on modular learning of grade five pupils. A type of psychometric response scale in which responders specify their level of agreement to a statement typically in five points: 5 – Strongly Agree (SA), 4 – Agree (A), 3 – Undecided (U), 2 – Disagree (D) and 1 – Strongly Disagree (SD).

The data gathered for this study was subjected to the following statistical tools:

RESULTS AND DISCUSSION

Perceived Effects of Modular learning to the Respondents as a Whole and when grouped as to Sex

Results revealed that as a whole, the perceived effects of modular learning were “*I learn somehow because of the provided link for videos, like educational videos that serve as an additional learning material that I can use to answer the different tasks on our module*” ranked first with the mean of 4.93. “*I feel lazy sometimes, letting others answer my modules*” ranked 2nd with a mean of 4.40, and lastly, “*Modular learning allows me to study, learn and discover the things I wanted to find independently*” ranked 3rd with a mean of 4.20. Results are shown in Table 2.

Table 2. Perceived Effects of Modular Learning to the Respondents as a Whole

	Mean	Rank
Modular learning is helpful and effective for my growth and development.	3.67	
I find modular learning a time-wasting activity.	3.00	
I had a hard time accomplishing all the learning tasks on my self-learning modules on time.	2.33	
I learn somehow because of the provided link for videos, like educational videos that serve as an additional learning material that I can use to answer the different tasks on our module.	4.93	1 st
Modular learning allows me to study, learn and discover the things I wanted to find independently.	4.20	3 rd
I had difficulty learning alone since there were questions only my teacher can answer.	4.07	
It's difficult for me to study through printed materials; I still need to read but don't have resources like books and the internet.	3.27	
I find modular learning easy since I can study at my own pace and time.	3.47	
Modules are helpful. It helps us think and work independently.	4.00	
I feel lazy sometimes, letting others answer my modules.	4.40	2 nd

When taken as to Sex, perceived effects of modular learning were “*I learn somehow because of the provided link for videos, like educational videos that serve as an additional learning material that I can use to answer the different tasks on our module*” ranked 1st with a mean of 4.88. “*Modular learning allows me to study, learn and discover the things I wanted to find independently*” ranked 2nd with a mean of 4.25. “*I had difficulty learning alone since there were questions only my teacher can answer*” and “*I feel lazy sometimes, letting others answer my modules*” tied in ranked 3.5 with means of 4.13 according to male respondents. However, as to female respondents, perceived effects of modular learning were “*I learn somehow because of the provided link for videos, like educational videos that serve as an additional learning material that I can use to answer the different tasks on our module*” ranked 1st with a mean of 5.00. “*I feel lazy sometimes, letting others answer my modules*” ranked 2nd with a mean of 4.71, and “*Modular learning allows me to study, learn and discover the things I wanted to find independently*” ranked 3rd with a mean of 4.14. Results are shown in Table 3.

Table 3. Perceived Effects of Modular Learning to the Respondents as to Sex

The teacher...	Male		Female	
	Mean	Rank	Mean	Rank
Modular learning is helpful and effective for my growth and development.	3.50		3.86	
I find modular learning a time-wasting activity.	2.50		3.57	
I had a hard time accomplishing all the learning tasks on my self-learning modules on time.	2.38		2.29	
I learn somehow because of the provided link for videos, like educational videos that serve as an additional learning material that I can use to answer the different tasks on our module.	4.88	1 st	5.00	1 st
Modular learning allows me to study, learn and discover the things I wanted to find independently.	4.25	2 nd	4.14	3 rd
I had difficulty learning alone since there were questions only my teacher can answer.	4.13	3.5	4.00	
It's difficult for me to study through printed materials; I still need to read but don't have resources like books and the internet.	3.50		3.00	
I find modular learning easy since I can study at my own pace and time.	3.88		3.00	
Modules are helpful. It helps us think and work independently.	4.00		4.00	
I feel lazy sometimes, letting others answer my modules.	4.13	3.5	4.71	2 nd

Mann-Whitney U test result shows no significant difference in the perceived effects of modular learning when respondents were grouped as to sex [$U_{\text{value}}=25.500$; $p=.771$]. The two-tailed probability of .771 was greater than the set alpha level of .05. The result further implied that the perceived effects of modular learning were the same for both male and female respondents. Results are shown in Table 4.

Table 4. Difference in the Perceived Effects of Modular Learning to the Respondents as to Sex

Compared Means	Mean Rank	U_{value}	Sig.	Interpretation
Sex				
Male	7.69	25.500	.771	Not Significant
Female	8.36			

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

The pupils learn to study, learn, and discover the things they wanted to know independently using the educational links.

Both the male and female respondents were able to learn and study independently.

Both male and female respondents implying no significant difference in the perceived effects of modular learning.

RECOMMENDATIONS

Based on the conclusions, some recommendations were given:

School Administrators must increase the opportunity of sending teachers to training such as module making, etc. Teachers should produce quality modules and avoid lengthy and bulky one.

Pupils should practice working with their modules independently.

Parents must also encourage their children to study independently.

This study will serve as baseline data for further studies.

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ROLL-ON, ROLL-OFF TRANSPORTATION SYSTEM: ITS IMPACT ON AGRICULTURE, TOURISM AND TRADE INDUSTRY IN DUMANGAS, ILOILO

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ABSTRACT

This descriptive-survey research aimed to find out the impact of Roll-on roll-off Transportation system in Dumangas in terms of Agriculture, Tourism and Trade Industry when respondents were grouped as to type of passenger. The respondents of the study were the 150 passengers categorized as farmer, entrepreneur, and tourist from Dumangas RORO Port situated at Barangay Sapao, Sitio Naluoyan, Dumangas, Iloilo. The statistical tools used were the frequency count, percentage, and mean for descriptive statistics and ANOVA for inferential statistics. Significance level was set at 0.05 alpha. The findings revealed that the Roll-on Roll-off Transportation System in Dumangas, Iloilo has a “Very Strong” impact in terms of agriculture, tourism and trade industry when respondent were grouped as to type of passengers. The findings also revealed that there was no significant difference in the impact on Roll-on Roll-Off Transportation System on agriculture, tourism and trade industry in Dumangas, Iloilo when respondent was grouped as to type of passengers. Based on the findings of the study it was recommended that a policy reform in the area of the sea transport must take into consideration which could help improve the system in the area. With the collaboration among stakeholders, a formulation of comprehensive development plan is also recommended for the sustainability of sea port.

Keywords: Impact, Roll-on Roll-Off Transportation System, Agriculture, Tourism, Trade Industry.

INTRODUCTION

Philippine Archipelago is a unique geography characterized of 7,107 islands composed of coastal lines of 235,973 square kilometers. Gifted with alluring and natural resources of geographical configuration highly demands on special works connectivity to move goods, commodities and people.

Like the various pieces of a jigsaw puzzle that must be locked together. These islands needs to be linked efficiently by a seamless transport infrastructure network providing inter-modal land air and sea transport system that form an integrated national highway (Basilio 2008) efficient maritime transportation infrastructure is required with the use of ports and shipping in order to satisfy socioeconomic integration.

In 2003, Executive Order (EO) No. 170 was issued to promote the Roll-on Roll off (RORO) shipping mode-which allows vehicles containing cargoes to roll on and roll off a ship, thus doing

away with cargo handling-as a means of linking the various islands of the Philippines archipelago via the so-called “moving bridges” that connected the 919-kilometer nautical highway that connects 17 cities, towns and islands of Luzon, Visayas and Mindanao.

Dumangas was lucky enough to be a part of the Western Nautical highway and the gateway of socioeconomic development which caters goods, commodities, and tourist from any point of the country to the various neighboring islets of the Philippines. Dumangas is the busiest in terms of RORO traffics which the RO-RO trip from Dumangas to Bacolod (BREDCO port) approximately takes 1 ½ hours and cover a total distance of 22 nautical miles as cited by Macabato in 2013.

The absence of connectivity among the various Philippine “island economies” is an important factor contributing to poverty and underdevelopment (ADB, 2010). Proper allocation and distribution of goods and services is required. Delay in productivity lead into unbalance economic condi-

tion and produces large transportation cost and unproductive business.

With the aim of this RORO Project to create opportunities, economic development, and enhancement of productivity in the economy of Dumangas, this research study aimed to analyze the impact of implementing this kind of sea transportation system. Thus, the researcher would like to study the impact of Roll-on, Roll Off transportation system on agriculture, tourism and trade industry in Dumangas which is a part of western route of the nautical highway.

STATEMENT OF THE PROBLEM

This study aimed to determine the impact of roll-on Roll off Transportation System on Agriculture, Tourism and Trade industry in Dumangas.

Specifically, it sought to answer to the following questions:

1. What is the impact of RRTS in Dumangas in terms of agriculture, tourism and trade industry when respondents were taken as a whole?
2. What is the impact of RRTS in Dumangas in terms of agriculture, tourism, and trade industry when respondents were grouped as to type of passengers?
3. Is there a significant difference in the impact of RRTS in Dumangas in terms of agriculture, tourism, and trade industry when respondents were grouped as t type of passengers?

CONCEPTUAL/THEORETICAL FRAMEWORK

This study was anchored on the theory of Chlemsky’s evaluation theory. His ideas relevance to the researcher’s belief that the evaluation can be a tool for the improvement an existing activity, practices, program or project. Chlemsky’s points out that one’s work can be evaluated on the basis of the accountability of the founders, manager and people working with; secondly, using it as a management tool which is concerned with the making of judgement about the effectiveness, efficiency and sustainability of the piece of work; and lastly. To take it as an aide to strength a practice, organization and programs. This is directed at the enhancement of work undertaken with particular individuals and groups. The learning involved is oriented towards future action.

This study was focused on the impact of Roll-on Roll-Off Transportation system on agriculture, tourism, and trade industry in Dumangas Iloilo where the type of passenger that includes the farmers, entrepreneur and tourist are the independent variables, while the impact of RRTS on agriculture, tourism and trade industry in Dumangas are the dependent variables. The association of this variables is was conceptualized in Figure 1.

PARADIGM

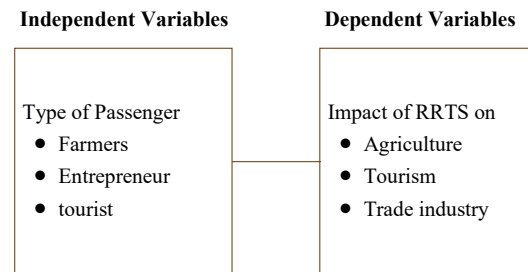


Figure 1. Variables associated with the impact of Roll-on Roll-off Transportation System in Dumangas

SIGNIFICANCE OF THE STUDY

The result of the study would be beneficial to the following:

Local Government Unit. This study would be beneficial in the development and improvement of the community and the economic aspect of the municipality of Dumangas.

Philippine Port Authority- This result of the study serves as a guide for the improvement and development of the port transport system.

Department of Tourism. This study will serve as a guide for the awareness and development of tourism industry.

Department of Agriculture. The findings of the study serve as a guide for the awareness and development of the agriculture of Dumangas.

RRTS Passengers. This serves as an information for the passenger and tourist who travel in RO-RO Port.

Investors. This study gives an information; facts for the investors seeking for a place to invest or to build business.

Researchers. The result of the study serves as a guide for the future study of RORO Transport system.

METHODOLOGY

This study employed the descriptive survey methods of the study. Its is a quantitative research method that attempts to collect quantifiable information for statistical analysis of the population sample. It allows us to collect and describe the demographic segment's nature. The researcher used a close-ended questions to draw concrete conclusions about the respondents. The respondents of the study were the 154 passengers categorized as farmers, entrepreneur, and tourist. The respondents are selected using convenience sampling techniques which involves using respondents who are "convenient" to the researcher. There is no pattern whatsoever in acquiring these respondents—they are merely are present in the RO-RO Port, Barangay Sapao, Sitio Naluyayan, Dumagas, Iloilo, one of the important ports of Western Nautical Highway a gateway to Bacolod BREDCO Port which is the locale of the study.

The study utilized the researcher-made questionnaire to determine the impact of Roll-on, Roll-off Transportation System on Agriculture, Tourism and Trade Industry in the focus site of the study. The instruments have two parts. Part one is the information about the respondent. Part two is the proper questionnaire which will used a Four Point scale to quantify the data gathered. The responses used are Very Strong (5), Strong (4), Moderately Strong (3), Low (2), and No Impact (1). Frequency count, percentage, and mean are employed for descriptive analysis and ANOVA was used for inferential analysis.

RESULTS AND DISCUSSION

The result of the study involves the descriptive and inferential analyses of the data gathered and its corresponding interpretation.

Descriptive Analysis

Impact of RRTS in Dumangas in terms of Agriculture, Tourism, and Trade Industry when Respondents were taken as a Whole.

Table 1 shows the impact of RRTS in terms of agriculture, tourism, and trade industry when respondents were take as a whole.

Generally, the impact of roll-on, roll-off transportation system in Dumangas in terms of agriculture, tourism and trade industry as a whole had a "Very Strong Impact" with a CM=4.43

The impact of Roll-on, Roll-off Transportation System in Dumangas in terms of Agriculture, Tourism, and Trade Industry ha a "Very Strong Impact with M= 4.63, M= 4.27 and M=4.41 respectively. Table 2 present the data.

Table 1. Impact of RRTS in Dumangas in Terms of Agriculture, Tourism, Trade and Industry as a whole

Category	Mean	Description
Agriculture	4.63	Very Strong
Tourism	4.27	Very strong
Trade Industry	4.41	Very Strong
CM	4.43	Very Strong

Legend

Scale

4.21-5.00
3.41-4.20
2.61-3.40
1.81- 2.60
1.00- 1.80

Descriptive Rating

Very Strong

Strong

Moderately Strong

Low

No Impact

Impact of RRTS in Dumangas in terms of Agriculture, Tourism, and Trade Industry when group as to Type of Passenger

The data in table 2 shows the impact of RRTS in agriculture, tourism and trade industry when respondents were grouped as to type of passenger.

The finding of the study revealed that the impact of RRTS to the respondents when taken as a whole, was "very strong" in terms of agriculture, tourism and trade industry. Furthermore, the study revealed that the impact of RRTS to the respondents when grouped as to type of Passenger was also "Very Strong" with the cumulative mean of 4.55; entrepreneur with 4.39; tourist 4.38 respectively.

The impact of RRTS to farmer respondents "Very Strong" in terms of agriculture (M=4.42); Tourism (M=4.42), and trade industry (M=4.65).

For entrepreneur the impact of RRTS in Dumangas was "Very Strong" in terms of Agriculture (M=4.73); tourism (M=4.19); and for trade and industry (M=4.25).

For tourist viewed the impact of RRTS in Dumangas was also "Very Strong" in terms of agriculture (M=4.58); tourism (M=4.20); and trade industry (M=4.36).

Table 2. Impact of RRTS in Dumangas in terms of Agriculture, Tourism, and Trade Industry when group as to Type of Passenger

Category	Farmer		Entrepreneur		Tourist	
	M	D	M	D	M	D
Agriculture	4.58	VS	4.73	VS	4.58	VS
Tourism	4.42	VS	4.19	VS	4.22	VS
Trade and Industry	4.65	VS	4.25	VS	4.36	VS

Legend

Scale	Descriptive Rating
4.21-5.00	Very Strong
3.41-4.20	Strong
2.61-3.40	Moderately Strong
1.81- 2.60	Low
1.00- 1.80	No Impact

Difference in the Impact of Roll-on, Roll-off Transportation System in Dumangas in Terms of Agriculture as to Types of Passenger

Table 3 shows the result of the test of significant difference in the impact of RRTS in Dumangas in terms of agriculture as to type of passenger.

ANOVA results in table 3 reveals that there is no significant difference in the impact of RRTS in Dumangas in terms of Agriculture when grouped as to type of passenger, $F(2,97)=.0770$, $P=.466 > .05$ alpha. Table 3 presents the data.

Table 3. Difference in the Impact of Roll-on, Roll-off Transportation System in Dumangas in Terms of Agriculture as to Types of Passenger

Sources of Variation	df	Sum of Squares	Mean Squares	F-value	F-prob	Interpretation
Between groups	2	.511	.256	.770	.466	NS
Within groups	97	32.213	.332			
Total	99	32.724				

Difference in the impact of Roll-on, Roll-off Transportation System in Dumangas in Terms of Tourism as to Type of Passenger

Table 4 shows the result of the test of significant difference in the impact of Roll-on Roll-off transportation System in Dumangas in Terms of Tourism as to type of passenger.

ANOVA results reveals that there is no significant difference in the impact of RRTS in Dumangas in terms of agriculture when grouped as to type of passenger since the computed value $F(2,97)=1.577$, $P=.212 > .05$ alpha. Table 4 presents the data.

Table 4. Difference in the Impact of Roll-on, Roll-off Transportation System in Dumangas in Terms of Tourism as to Types of Passenger

Sources of Variation	df	Sum of Squares	Mean Squares	F-value	F-prob	Interpretation
Between groups	2	.964	.482			
Within groups	97	29.648	.359	1.577	.212	NS
Total	99	30.612				

Difference in the Impact of Roll-on Roll-off Transportation System in Dumangas in Terms of Trade Industry as to Type of Passenger

Table 5 shows the result of the test of significant difference in the impact of Roll-on, Roll-off Transportation System in Dumangas in terms of trade industry as to type of passengers.

ANOVA results reveals that there is no significant difference in the impact of RRTS in Dumangas in terms of trade industry as to type of passenger. Since the computed value $f(2,97) = 3.964$, $P=.022 > .05$ alpha. Table 5 presents the data.

Table 5. Difference in the Impact of Roll-on Roll-off Transportation System in Dumangas in Terms of Trade Industry as to Type of Passenger

Sources of Variation	df	Sum of Squares	Mean Squares	F-value	F-prob	Interpretation
Between groups	2	2.843	1.422			
Within groups	97	34.787	.358	3.946	.022	NS
Total	99	37.630				

SUMMARY

This implies that RRTS has a very strong impact on the agriculture, tourism and trade industry this is also through according to the perception of the respondent regardless of the type of passenger

Finally, the study revealed that there was no significant difference in the impact of Roll-on Roll-off Transportation System in Dumangas in terms of Agriculture, tourism and trade industry when taken as a whole and when grouped as to type of passenger.

CONCLUSION

Based on the finding of the study, it was concluded that the impact of Roll-on Roll-off Transportation System had a "Very Strong" impact on agriculture, tourism and trade industry in Dumangas which means that the RRTS was truly a gateway for boosting economy, enhance sociocultural aspect and has an effect on environmental aspect of the municipality. The RRTS show that there is hope for the underdeveloped community to grow to its highest level, inter-island trade followed the same uptrend, tourist arrival may breach to its highest peak, inter-island trade domestic cargo and passenger traffic shipped by sea reached increasingly. RO-RO shipping has facilitated its

very high impact towards sustainable development in Dumangas.

The impact of this RRTS is encouraging. There is a lessening in the transport cost for the goods, and the frequency of deliveries increases. Businesses started to change their business models, farmers in isolated areas enhance its market access, business activities increases on the municipality where there was hardly any before, local government revenue increases and tourism will be expanded.

RECOMMENDATIONS

Based on the findings of the study it was recommended that a policy reform in the area of the sea transport must take into consideration which could help improve the system in the area. A simple policy reform in the area of the sea transport can have a large positive impact on the lives of the people in the municipality. The lesson of these policy reforms coupled with public investments, could also have a material impact on the local economy.

With the collaboration among stakeholders, a formulation of comprehensive development plan is also recommended for the sustainability of sea port.

A sustainable development plan is a road map for achieving long-term goals and documents strategies to continue the program, activities, and partnerships. The key principle of sustainable development underlying all others is the integration of environmental, social, and economic concerns into all aspects of decision making. All other principles in the SD framework have integrated decision making at their core (Stoddart, 2011). It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy. The Local Government Unit and other government agencies such as the Department of Agriculture, the Department of Tourism and the Philippine Port Authority are typically organized to address concerns that cover their duties and responsibilities. In practice, sustainable development needs the integration of economic, environmental, and social objectives across sectors, territories, and generations. Therefore, sustainable development requires the elimination of fragmentation; that is, environmental, social, and economic concerns must be integrated throughout decision making processes in order to move towards development that is truly sustainable (Emas, 2015).

For the future researcher, similar studies using different variables can be conducted to evaluate the impact of Roll-on Roll-off Transportation System in Agriculture, Tourism and Trade Industry in Dumangas, Iloilo

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COMMUNITY NEEDS ASSESSMENT OF CLARIN, BOHOL: INPUTS TO AN INTEGRATED LIVELIHOOD PROJECT

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ABSTRACT

An institution cannot successfully implement a project, unless a benchmark survey on the felt-needs of the community is conducted. As such, this paper delved into surveying the needs of the respondents. It specifically identified the respondent's age and sex, educational attainment, number of household members, monthly income, members with income, their main occupation as the source of livelihood, their priority needs for survival, seminar/training needs, relationship of needs and monthly income, and the proposed extension project. Using descriptive-survey method with convenience sampling technique, it included 58 households as endorsed by their Punong Barangay One from each household was taken as research participant. Result showed that respondents were mostly female, in their golden years, college level, earned very low monthly income, with 3-8 members in the household, with father as the breadwinner, and fishing as their main source of survival. Furthermore, it showed that insufficient income to address their basic necessities was among the topmost of their priority needs. Correlating such felt-need towards their monthly income yielded significant result which means that the respondents' priority needs were affected by their monthly earnings. This further implies that the meager their income, the greater their needs. In other words, their monthly income is a factor towards their needs. Thus, an integrated livelihood project was proposed. Subsequently, an integrated livelihood project was launched.

Keywords: Assessment, community needs, integrated livelihood, convenience sampling

INTRODUCTION

As members of a developing country, Filipinos have been striving very hard to alleviate life standards. However, due to several factors, they are in constant need for assistance from external support. Speaking of need here is defined by the American Heritage Dictionary of the English Language, (2011) as a condition or situation in which something must be supplied in order for a certain condition to be maintained or a desired state to be achieved. For Basic Knowledge 101 (n.d.), need means lacking of something or someone that is very essential and important. It is something that is necessary to live a healthy life. Thus, we contend that community needs are the lacking elements for its people to have. These

lacking elements become their problems for survival.

As the primordial aim of the study, identifying needs means determining what is that something that the community members really lack amidst their present condition. We emphatically contend that what they really lack are their indispensable needs. As such, Swatek (2015), claimed that the root of needs assessment lays the very notion of need. For Altschuld and Watkins (2014), a need is a gap or discrepancy between what currently is and what should be. In other words, gap here represents the problem that people presently experience that possibly hinders their desired future state which must be addressed.

Our world faces unlimited needs, however,

limited resources. Needs assessments help to identify areas that will do the best for the most people over time. It is a process of identifying what people need where they live, work or play (Donaldson & Franck, 2016). Hence, the purpose thereof is to use the information gained to make plans to meet those needs. Moreover, needs assessment also includes making judgments with regard to needs and putting them into prioritized order to guide decisions about what to do next (Altschuld & Watkins, 2014). It is an exploratory journey that assists people to create and tailor services and supports that make sense within their unique community context (Good Practice and Resource Guide on Community Needs Assessment and Service Evaluation in Military Family Resources Centers, 2004), a process of asking group or community members what they see as the most important needs of that group or community (Berkowitz & Wadud, 2013).

Moreover, as the name suggests, community needs assessments gather information to learn about the main issues that people face within a community. The results of the survey will then guide future action for the project proponent. Generally, the needs that are rated most important are the ones that get addressed. On her part (Jones, 2014) said that a needs assessment is a systematic set of procedures that are used to determine needs, examine the nature and causes of these needs, and set priorities for future action. Thus, needs assessment is identifying the present discrepancies in order to come up with the desired solutions.

Putting it into the researchers' context, a community and any academic institution are co-existent. As such, one could not live in a vacuum; nevertheless, they both compliment with each other. The improvement of one is tantamount to the other. Whatever academic success could be best attributed with the synergetic collaboration of its stake holders. Without the helping hands of the community where such institution exists, the euphoria of such institution would lag behind. Partnership between the two entities is deemed indispensable. It is the community that would spread news to other communities what an institution has been performing as best practices. It is in the community where concerted efforts should start. In return, such institution would do its share of extending services to them.

With this, Bohol Island State University (BISU) is duty-bound to commit itself to do extension programs and community development because it is a mandated function that Bohol Is-

land State University (BISU), Clarin, Bohol is expected to perform. As catalyst of change, the Extension and Training Service division of BISU initiated a move to identify the needs of the immediate community in order to benchmark any workable intervention program and project for livelihood alleviation as identified in the community. As a matter of collaboration, intervention strategies were done collectively with the local officials and with the identified beneficiaries in the identified barangay Bonbon.

Barangay Bonbon in the municipality of Clarin, Bohol became the target recipient site of the survey because it was one among the barangays of the said town which was hit badly by such monstrous earthquake of 7.2 magnitude that devastated Bohol last October 15, 2013. It is a coastal barangay with around three hundred households which is situated a few kilometers away from the heart of the town. It is a fishing village where the predominant means of living is related to fisheries along with agriculture and business. While the other parts of Bohol experienced shore uplift due to such earthquake, barangay Bonbon experienced the opposite which makes the barangay suffer flooding during sea-rise which threatens the lives of the people. Although relief operations and distribution of housing materials to the victims have come underway in the province, there are still helpless and homeless victims as of the moment. In fact, there are still families and barangay folks who are displaced and wanted assistance for their immediate recovery. This prompted the management of BISU Clarin Campus through the office of the RDE with the support of the different academic units and support personnel to conduct the survey to serve the purpose of helping the affected communities. The result of the survey will be used to count on the competencies and skills that the personnel of the campus university can offer in order to match the training needs and priorities of the beneficiaries.

Dealing with theoretical underpinnings, Maslow's Hierarchy of Needs Theory (1943) specifically emphasizes personal security, financial security, health and well-being, safety net against accidents/illness and their adverse impacts, friendship, intimacy, belongingness, love, family, physiological, esteem, self-actualization, and self-transcendence (Corporate Finance Institute, 2015). For Aruma, and Hanachor, (2017), Maslow's hierarchy of needs further focuses on exploration of human desire to address people's needs in order to improve their living conditions

in human environment. This is where we anchor our present study. There is also the so-called Felt-need Theory of community development that says that basic needs, as experienced emotionally and as expressed by the population, need to be addressed and relieved as quickly as possible. The emphasis is on immediate alleviation of problems. For Wade, (1989), felt needs are changes deemed necessary by people to correct the deficiencies they perceive in their community. The use of felt needs in community development practice involves the process of identifying needs, ranking their importance, and building programs based on the ranking. This theory is somehow related to the former theory mentioned here.

Acknowledging that a company is only as strong as the communities it serves, Bohol Island State University has imbibed thoughts of serving the community and taken it a step forward. By planning to propose extension programs for the target barangay, BISU is not only helping the beneficiaries in the community, but as well, it is investing in the future. As consolation, an enhanced community relations and maximized partnership with other agencies will be derived from such undertaking (Bandy, 2011). Tylor and Brunson (2013) stressed on the importance of a community needs assessments as it seeks to gather accurate information representative of the needs of a community. Assessments are performed prior to taking action and are used to determine current situations and identify issues for action. Needs assessments establish the essential foundation for vital planning. For McCawley, (2009), community needs assessment is a specific application for a targeted population that has recurring value for extension.

OBJECTIVES

The study primarily aimed at determining the priority needs of the target beneficiaries in barangay Bonbon, Clarin, Bohol, inputs for a proposed integrated livelihood project. Specifically, it identified [1] the respondents' profile in terms of age and sex; [2] their educational attainment; [3] number of household members; [4] monthly income; [5] number of household members with income; [6] main occupation as source of livelihood/income; [7] priority needs, seminar and training needs; [8] the correlation between their needs and the monthly income of the household members; and [9] the proposed extension project as an intervention measure.

METHODOLOGY

Using descriptive-correlational research designed employing the convenience sampling technique, it identified 58 household members in community as endorsed by its Punong Barangay.

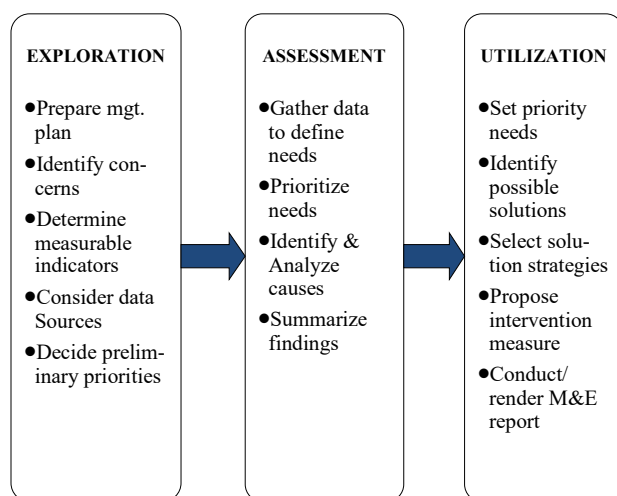
The conduct of said assessment was done in three phases; (1) exploration, (2) assessment, and (3) utilization as adopted from Donaldson, and Franck, (2016). In the exploration phase, the Research and Development, and Extension (RDE) Director with his RDE Chair initiated a conference with the Punong Barangay of barangay Bonbon, Clarin, Bohol. Having invited him in the university campus, said RDE personnel handed in the request letter for the said community needs assessment survey. This was made to secure permission and allow discussion relative to the conduct of the survey. The said barangay official granted such request. Further, during the conference, the RDE personnel shared the purpose of the assessment, the potential uses and users of the assessment information, and the parameters of the assessment. When all systems went right, the activity commenced as planned.

During the assessment phase, the researchers used descriptive-survey design in the study. This approach is appropriate in order to know the extent of the needs, priorities and problems experienced by the participants that should be addressed with long term effect. In the data gathering procedure, the researchers made use of a self-directed questionnaire, structured interview, a focus group discussion with the participants, and observation in the research environment. These were administered to the selected respondents. These respondents were the ones negotiated by their Punong Barangay during the presurvey undertaking as requested by the RDE Unit personnel, the project proponent. Sixty (60) participants were requested to be the targeted number of samples in the survey. However, two of them did not come for some unknown reasons. Hence, only 58 were the total number of respondents. The conduct of the survey took for more than an hour. Then, the RDE staff collected, analyzed, and synthesized the data gathered. Below is the Likert scale used in determining their priority needs:

Range	Description
3.21 – 4.00	needs immediate action/very much needed
2.31 – 3.20	needs action/much needed
1.51 – 2.30	not that much action needed/not that much needed
1.00 – 1.50	does not require action at all/not needed at all

Two months after, the RDE team went back to the said barangay to disseminate the results of the assessment. The team also conducted focus group discussion to some selected barangay officials as key informants and some respondents. Some members of the RDE team went to their residences for ocular observation for validation of the survey results.

In the utilization phase, the project management team launched the intervention project on July, 2014 based on the results of the survey. The prepared management plan which set priority needs, objectives, identified possible solutions, with persons involved was put into place. It was titled “Integrated Livelihood Project. Subsequently, the conduct of series of capability building, and training/seminar-workshop was implemented among target beneficiaries to carry out the project. The project management also conducted annual Monitoring and Evaluation of the progress of the program, activities, and projects’ (PAPs) implemented. Fig.1 illustrates the three-phase model of effective needs assessment adopted from Donaldson and Franck, (2016).



RESULTS AND DISCUSSION

This portion of the survey presents the data gathered in tabular form. The data were analyzed, interpreted, and discussed according to the problem statements.

Profile of the Respondents

The profiles of the respondents were asked to serve as a data bank for future researchers.

Table 1. Age and sex of respondents

AGE	Male	%	Female	%	TOTAL	%
20-25 yrs. Old	0	0	2	5.56	2	3.45
26-30 yrs. Old	1	4.55	3	8.33	4	6.90
31-35 yrs. Old	2	9.09	4	11.11	6	10.34
36-40 yrs. Old	1	4.55	3	8.33	4	6.90
41-45 yrs. Old	7	31.81	6	16.67	13	22.41
46-50 yrs. Old	4	18.18	7	19.44	11	18.97
51 and above	7	31.81	11	30.56	18	31.03
TOTAL	22		36		58	100%

The respondents were more than 50 years old (18 or 31%), and were mostly female (36 or 62%). This simply indicates that even if they are in their golden years, women are still eager to earn and learn. They are indeed willing to take part in any undertaking that would somehow contribute to their daily living and sustenance.

Table 2. Educational attainment of household members

Educational Attainment	Father	Mother	Children	Other members of the family	Total	Rank
Elementary	10	2	8	0	20	5
Elementary level	12	5	10	0	27	3
High school graduate	9	16	13	1	38	2
High school level	7	7	10	2	26	4
Vocational graduate	0	0	1	0	1	8.5
Vocational level	3	1	1		5	7
College graduate	4	2	6	1	13	6
College level	13	13	16	0	43	1
None	0	0	1	0	1	8.5

Where most of the parents have reached college education, their children are also of the same educational attainment, that is most of them are college level and high school graduate. Despite of their being college levels, most of them are unemployed mothers. The researchers claimed that these respondents are of great help in the sustainability of whatever projects and programs to be designed and implemented considering their educational possessions.

Table 3. Number of household members

HOUSE-HOLD MEMBER	MALE	%	FEMALE	%	TOTAL	%
0-2	2	3.55	3	5.17	5	8.62
3-5	9	15.52	14	24.14	23	39.66
6-8	9	15.52	13	22.41	22	37.93
9-11	1	1.72	6	10.34	7	12.07
12-14	1	1.72	0	0	1	1.72
Total	22	39.66	36	60.34	58	100

The respondents have 3-8 household members. This result is not uncommon to barangays where the source of livelihood is mainly relying on fishing, fish vending, having a small sari-sari store/neighbourhood sundry store, and serving as sales women/men.

Table 4. Household monthly income

MONTHLY INCOME	MALE	%	FEMALE	%	TOTAL	%
500 below	0	0	1	1.72	1	1.72
500-999	2	3.45	2	3.45	4	6.90
1,000-1,499	1	1.72	4	6.90	5	8.62
1,500-1,999	1	1.72	2	3.45	3	5.17
2,000-2,499	4	6.90	5	8.62	9	15.52
2,500-2,999	3	5.17	2	3.45	5	8.62
3,000-3,499	1	1.72	2	3.45	3	5.17
3,500-4,000	2	3.45	6	10.34	8	13.79
4,500-4,999	2	3.45	2	3.45	4	6.90
5,000-5,499	2	3.45	5	8.62	7	12.07
6,000-6,499	3	5.17	2	3.45	5	8.62
10,000-10,499	0	0	3	5.17	3	5.17
11,000 up	1	1.72	0	0	1	1.72
TOTAL	22	39.64	36	60.36	58	100%

This data shows that most of the respondents earned as low as P2, 000.00 a month. This means that they are living in extreme poverty. In 2014, the Philippine Statistics Authority said that a family of five needed at least PhP6,125 on the average every month to meet the family's basic food needs and at least PhP8,778 on the average every month to meet both basic food and non-food needs. These amounts represent the monthly food threshold and monthly poverty threshold, respectively.

Whether the respondents have divulged their real monthly income or not, ocular observations coupled with interviews from their neighbourhood folks revealed the truth of the matter. Their monthly income is based on their situation after the devastation of such 7.2 magnitude earthquake. Much more, the respondents were negotiated by the Punong Barangay of which he believes they need to be helped whatever assistance the project proponent can extend to them.

Table 5. Number of household members with income

	MALE	FEMALE	TOTAL	%
None	5	6	11	19
One	13	19	32	55
Two	3	8	11	19
Three	1	3	4	7
TOTAL	22	36	58	100

This table reveals the number of household members who have income. It shows that majority, 32 or 55%, of the members relied on one member who earns a living. This "one" refers to the father of the family who is the sole bread winner. Surprisingly, 11 or 19% of the respondents claimed that none of the family members living in the household have income. In the focus group discussion, they said that they relied their daily sustenance from the meager amount of money sent by their sons or daughters in the cities, outside the province, or abroad.

Table 6. Family's occupation as source of livelihood/income

OCCUPATION	RESPONDENTS		TOTAL
	Male	Female	
Brgy. Official	0	2	2
Brgy. Police/Tanod	4	0	4
Carpentry	2	0	2
Cook	2	2	4
Dressmaking	0	3	3
Driving	3	0	3
Fishing	9	0	9
Helper or laborer	1	1	2
Laundry woman/man	0	3	3
Mid-wife	0	1	1
Saleslady/salesman	0	5	5
Selling Fish/fish vending	0	9	9
Small business/ neighborhood sundry	0	5	5
Utility worker	1	1	2
Working in the factory	0	4	4
TOTAL	22	36	58

Respondents' occupations as sources of living are mainly fishing, fish vending, and sales persons. These are the usual sources of income with those barangay folks situated along the coast. This data validates of their low income since fishing activities rely only on favorable sea weather conditions. So, if they could not go fishing or have low fish catch, then there is no fish to sell.

Table 7. Priority needs of the respondents

PRIORITY NEEDS	4	3	2	1	wx	Rank
Barangay medical or health center	4	16	12	7	1.64	9
Consistent clean and green surroundings	15	21	14	8	2.74	4
Decent housing and shelter	11	19	16	2	2.33	5
Due care & attention for disabled family members	7	17	12	17	2.07	7
Enough knowledge and skills in improving entrepreneurial skills	32	20	5	0	3.41	2
Health and safety/proper hygiene	2	18	19	16	2.00	8
Job opportunities for women with skills on cosmetology, haircutting/hairdressing, dress-making, cooking, etc.	26	26	5	1	3.33	3

Proper child growth and nutrition	11	15	9	18	2.15	6
Stable jobs/employment of the members of the family	21	26	3	5	3.15	10
Sufficient income for the basic needs of the family	33	19	5	1	3.45	1

Here, the respondents claimed that their urgent and priority needs is how to augment their income to address their daily sustenance (3.45). This implies that they have insufficient income to combat with their basic needs; followed by the need of enough knowledge in entrepreneurial skills improvement, (3.41); and the lack of opportunity for women to develop their skills in cosmetology, cooking and the like (3.33); and lack of plants in the surroundings especially fruit bearing trees and vegetables (2.74) in adherence to the consistent clean and green program of the national government.

Table 8. Training and seminar needs of the respondents

Trainings and seminars needed	4	3	2	1	wx	Rank
Budget Preparation	20	27	9	0	3.09	2
Computer literacy	18	12	7	10	2.28	9
Dressmaking, curtains-making, etc.	13	35	6	0	2.91	4
First Aid, and Hygiene and Environmental Health	14	25	15	0	2.78	6
Further knowledge in the use of English language and Mathematics	18	20	12	0	2.69	8
Leadership training for the youth	19	24	9	4	2.93	3
Preservation of processed foods like meat, fish, and the like	17	20	12	6	2.72	7
Raising hog, goat, cow, etc.	24	21	2	1	2.83	5
Skills improvement in cooking	30	21	4	1	3.31	1

Among their training and seminar needs include foremost is their cooking skills improvement; budgeting, and youth leadership. The respondents firmly believe that these trainings are lacking in their barangay, and that needs immediate action. The researcher learned from the focus group discussion that computer literacy was their least needed training because they do not have any laptop position at homes and further commented that such training would be not useful at all.

Table 9. Proposed extension projects

PROPOSED PROGRAMS, ACTIVITIES, AND PROJECTS (PAPs)	f	Rank
Campaign against illegal drugs	40	6
Clean and Green project	52	2
Computer Tutorial or free computer training	18	12
Feeding and Livelihood Project	54	1
Free circumcision	34	8
Job Fair to bring job opportunities	28	10
Health and Medical Center in the Barangay	27	11
Medical Mission/free consultation & medication by doctors & dentists	50	5
Money Lending to be used as capital for small businesses	37	7
Scholarship Grants for their children	29	9
Skills Training in cooking, cosmetology, haircutting, hairdressing, etc.	51	3.5
Sponsorship on sports league (Basketball, Volleyball, etc.)	51	3.5

Having exposed to the above program for a choice, the respondents were convinced to have a feeding and livelihood program/project (54 or 93%), Clean and Green Program, (52 or 90%), and sports or physical wellness program, together with skills training in cooking, cosmetology, haircutting, hairdressing, etc., (51 or 88%). The researchers believe that their choices were sound and timely; thus, the project team commits to implement all these.

Table 10. Correlation of priority needs and their monthly income

t - probability value	Level of significance	Tabular value	Decision
9.854	0.05	1.96	Reject H_0

Contingency test revealed a significant result where the computed t-probability value (9.854) is much greater than the tabular value (1.96); hence, the null hypothesis is rejected, which means that the respondents' priority needs were affected by their monthly earnings. This further indicates that the meager their income, the greater their needs and problems. In other words, their income is a factor towards their needs. And that when they could earn other income or have other sources of earnings, then their priority needs will be taken care of.

CONCLUSION

The aforementioned findings have put the researchers to conclude that enough money is the overarching need of the respondents. Their very low monthly has compelled them to express their need of having sufficient income to augment their

monthly earnings in order to have a quality and healthy life. This simply implies that their insufficient monthly income is a factor to their needs. Hence, it indicates that the meager their income, the greater their needs, and the greater their needs, the more assistance they need for life's survival. And at the very least, this study has solved a social problem. Thus, the proposed integrated livelihood project is in order and indispensable in order to address their needs.

RECOMMENDATIONS

Based upon the findings of the assessment, the following recommendations are offered:

1. An integrated livelihood project be implemented as designed the soonest possible time.
2. Budget allocation to the said project must be maintained by the project proponent.
3. For cost-effective measure, the target beneficiary barangay shall adhere to the principle of counter-parting for the sustainability of the project.
4. Constant and consistent monitoring and evaluation of the program is enjoined.

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FISH POND WATER QUALITY WIRELESS REAL-TIME MONITORING AND CONTROL SYSTEM

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ABSTRACT

This study aimed to design and develop a Fish Pond Water Quality Wireless Real-Time Monitoring and Control System that can monitor water conditions such as water quality, pH, turbidity, and temperature and control the water properties operation processes such as triggering a water pump start (water changed) and water aerator to stopped once it reaches the value of its (normal parameters). The system was pilot tested at Regional Fisheries Freshwater Technology Center BFAR-RFFTC6 at Barotac Nuevo, Iloilo. The application was developed using Android Studio for programming code construction and designing the user interface. Arduino IDE API C++ programming was used as a back end. Node MCUesp8266 is also used to build in wireless communication. The respondents of the study were ten (10) Fisheries Experts and five (5) IT Experts are purposively selected. This study applied the Unified Modeling Language (UML) to describe the structure of the System. Likewise, this study used the Prototyping Method stated by (Kumar.et.al, 2013) as a guide in developing the plan. In evaluating the System, International Organization for Standardization (ISO) 25010:2011 software engineering standard is utilized. The Mean was used to analyze the data. In terms of product quality and quality in use criteria, all mean equivalents for each characteristic were described as "very effective." The study proved that the Fish pond water quality wireless real-time monitoring and control system is a little more expensive than its manual counterpart. However, this system is an efficient, useful, guide in managing the fish pond for a good harvest.

Keywords: Fishpond, Water Quality, Wireless, Real-time Monitoring, Control System

INTRODUCTION

Fisheries' farming, especially aquaculture, had been noted in the Philippines for economic growth. These helped augment balance and sustain the fast-changing demand in the market as well as for local resources. Fish catching and fish farming are relevant sources of employment, food, and revenue in the Philippines. (BFAR 2005)

According to Barnie (2015), pond water quality's proper management plays a significant role in aquaculture operations' success. Each water quality parameter alone can directly affect the animal's health. Exposure of fish to unacceptable levels of dissolved oxygen, ammonia, nitrite, or

hydrogen sulfide leads to stress and disease. However, in the complex and dynamic aquaculture ponds, water quality parameters also influence each other. Unbalanced levels of temperature and pH can increase the toxicity of ammonia and hydrogen sulfide. Thus, maintaining balanced water quality parameters is fundamental for both the health and growth of culture organisms.

The Bureau of Fisheries and Aquatic Resources (BFAR) is the government agency responsible for developing, improving, managing, and conserving fisheries and aquatic resources in the Philippines. As a government agency, the Bureau carried out various functions to properly manage and protect marine resources. One of the branches is the RFFTC-6 (Regional Freshwater

Fisheries Technology Region 6) located at Brgy. Salihid, Barotac Nuevo Iloilo, was established in April 2013, with a total land area of 1.4 hectares with six breeding ponds. This agency's mandate is to produce and disburse tilapia fingerlings in different LGU's and local fish farmers all over Region VI for the livelihood program to help the community. One of these station activities was maintaining good quality broodstocks tilapia breeders such as the "Improved GET EXCEL 2010B strain Tilapia," a parent line of hybrid *Oreochromis niloticus*, a progeny of Asian strain with the blood of *O. aureus* and improved BFAR strain. It is a product of an in-vitro fertilization wherein half of the gene ware taken from the cryo-preserved germplasm collection.

According to the RFFTC-6 data reports, in May 2016, the broodstock's mortality rate increased to 13.5% out of 2,000 broodstocks in five different breeding ponds. Almost 270 broodstocks died in just three days from May 13 – 17, 2016, due to unpredictable weather conditions such as high temperature and heavy cold rain. Pond water evaporation occurs in very high water temperatures from 28oC in the morning to 37oC in the afternoon (average pond water temperature ranges from 28oC to 32oC). The soil/mud in the pond bottom was also very hot resulted in bulging of eyes and stress of fish stock that leads to the gradual mortality of tilapia Broodstocks.

In this case, the RFFTC-6 personnel performed preliminary measures using pH meter to determine acidity or alkalinity of the water and further checked the water's color by seeing. Monitoring the level by increasing or decreasing ph level, measuring the water into 30cm turbidity, and water change is the process to maintain the ponds' excellent condition for tilapia broodstocks. Due to its manual operation, a problem arises, such as time-consuming, delayed water change, checking and monitoring of water condition is not real-time, which leads to the decrease of survival rate and disbursement of tilapia fingerling. Moreover, climate change, poor water quality management, and low-quality fish seeds were local fisheries' challenges.

The above situations prompted the researcher to develop a system entitled "Fishpond Water Quality Wireless Real-time Monitoring and Control System for RFFTC-6" to help sustain the high distribution of tilapia fingerlings in different LGU's and local small fish farmers in the region for a livelihood program.

STATEMENT OF THE PROBLEMS

(1) In this case, the RFFTC-6 personnel performed preliminary measures using pH meter to determine acidity or alkalinity of the water and further checked the water's color by seeing. (2) Monitoring the level by increasing or decreasing ph level, measuring the water into 30cm turbidity, and water change is the process to maintain the ponds' excellent condition for tilapia broodstocks. (3) Due to its manual operation, a problem arises, such as time-consuming, delayed water change, checking and monitoring of water condition is not real-time, which leads to the decrease of survival rate and disbursement of tilapia fingerling. Moreover, climate change, poor water quality management, and low-quality fish seeds were local fisheries' challenges.

The above situations prompted the researcher to develop a system entitled "Fishpond Water Quality Wireless Real-time Monitoring and Control System for RFFTC-6" to help sustain the high distribution of tilapia fingerlings in different LGU's and local small fish farmers in the region for a livelihood program.

OBJECTIVES

This study aimed to develop a "Fishpond Water Quality Wireless Real-Time Monitoring and Control System.

Specifically, this study aimed to:

1. design and develop a monitoring and controlling device that can:
 - a) determine real-time values of a critical level of water ph, turbidity, and temperature;
 - b) activate the water pump to start the water change;
 - c) control aerator to start and stop water cycle;
2. develop an android app to monitor the status and control the ponds operation and;
3. construct the device to simulate the for monitoring and control system;

METHODOLOGY

Life Cycle Processes of Prototyping Methodology

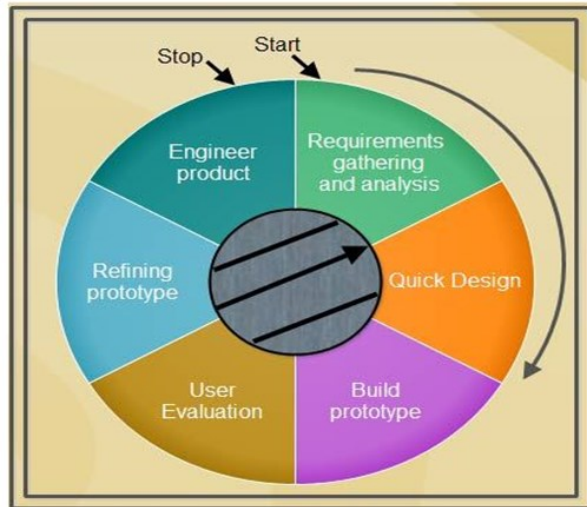


Figure 1. Software Development Life Cycle (Prototyping Model) (Naresh Kumar, A. S. Zadgaonkar, March 2013)

The researcher utilized the prototyping model for system development. The researcher applied the step by step procedures on how to plan the system. Figure 1 shows the following phases of prototyping models: requirements gathering and analysis, quick design, building the prototype, user evaluation, refining prototype, and engineer the product.

Requirements Gathering and Analysis. In this phase, the researcher began to plan and brainstorm the requirements needed to develop the system.

The following data gathering instrument was employed to gather appropriate information needed for the project.

Interview. The researcher interviewed the station manager RFFTC6 and selected staff. The discussion focused on the existing problems the RFFTC6 team encountered in monitoring the water condition in the pond propagation of fish and dispersing the tilapia fingerlings, the processes in monitoring water ph, and the problems encountered in breeding tilapia, and time spent in tracking the fishpond.

Observation. The researcher observed how the existing system operates, particularly about the fish farm processes, systematically recording the behaviors and characteristics of operations and procedures in the farm office. It helps the re-

searcher gather relevant information needed for the project shown in the appendix W.

Document Review. The researcher thoroughly views documents such as BFAR policy, instructions, and guidelines in breeding Tilapia to ensure that all information gathers is reliable. Sample documents are shown in the appendix U.

Surfing. The researcher gets some information on the internet as additional information regarding the study and widens its understanding of the study.

Validate data requirements. The researcher identified the major needs for data analysis, the pH probe, turbidity, and temperature sensors. The researcher allowed conducting testing in the fishpond using the three sensors to calibrate the fish pond's actual normal parameter values.

Quick design. In this phase, the researcher created a preliminary design. In this stage, the researcher drafted the system's initial design and included only the essential aspects of the system for the user to understand the process flow and give an idea on the design of the system. It is a basis for developing the system prototype.

In designing the system, the researcher used the UML Modeling Tools. The researcher created different diagrams, such as the use case, activity, state machine, block, and deployment diagram.

Build a Prototype. At this stage, the researcher created a prototype with the demonstrable result as early as possible and refining it. An incremental development based on refinement is also committed. The user interface and identification of necessary inputs, outputs, and processes are employed into place. Subsequently, in the implementation stage, the developer includes creating the prototype, program codes, and graphics for the system according to the first phase's requirements.

User Evaluation. In this phase, the researcher presents the prototype to the recipients or other project stakeholders for evaluation. The first sample model is tailored based on the users' comments and suggestion based on the agreed prototype, and the final design is built. The responses are accumulated in an organized way for further system enhancements.

Refining Prototype. In this stage, the researcher refines the prototype. The researcher reviewed the device. Once done, the device set for further enhancement based on factors like - time, workforce, and budget. Also, the technical feasibility of the actual implementation was checked.

Engineer Product. In the last stage, all the

components need to be thoroughly tested to reduce the risk of any major issues. Deployment-specific engineering: personnel training is strictly required. The final system is thoroughly evaluated and tested. Periodic maintenance is conceded on an ongoing basis for preventing large-scale breakdown as well as to minimize downtime.

FINDINGS

System Prototype

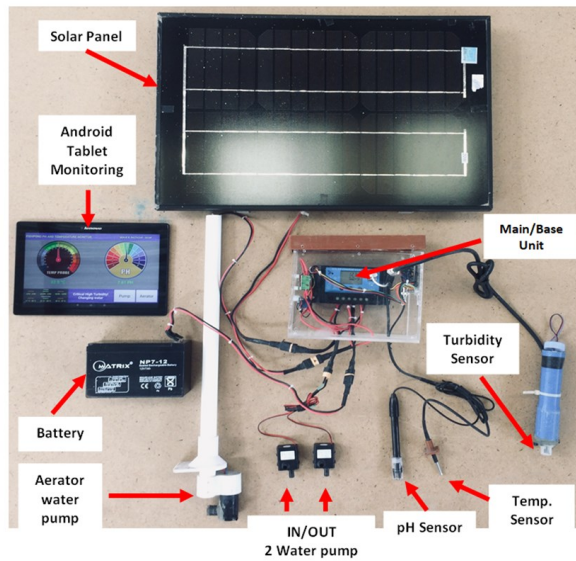


Figure 2. A Prototype of Fish Pond Water Quality Wireless Real-Time Monitoring and Control System

The system prototype comprises (9) components shown in Figure 2 above. (1) The 1 ½ meter solar panel using 20watts generates electricity through solar energy to bring power to the system. It stores electricity through the NP7-12 sealed rechargeable battery 12v/7Ah. These components are connected to the (2) main base unit that regulates electric energy, receives, sends information, and controls the device operations. (3) The 2m k type thermocouple probe stainless steel, with a 0-400c temperature sensor and waterproof probe wire, is used in measuring the water temperature, (4) Liquid PH Value detection sensor module used in measuring the pH level or 'power of hydrogen' (hydrogen ion concentration) using pH scale from 0 to 14 with seven being neutral, < 7 being acidic and > 7 being alkaline/basic to determine the critical level of water quality. (5) 5v DC analog turbidity sensor module gravity series

is used to detect the opaqueness of water. It uses light to detect suspended particles in water by measuring the light transmittance and scattering rate, which changes with total suspended solids (TSS) in water. It provides analog and digital signal output modes. (6) Two Ultra-quiet DC 12V 3M 240L/H Brushless Submersible Water Pump trigger the water replacement until it reaches the normal parameter values. (8) The temperature sensor measures the temperature that affects the water quality using a 12v submersible aquarium water pump. The sensor's raw data will be fed into the ESP8266 WiFi module with the simple and powerful LUA programming language or Arduino IDE. The MCU controller's information displayed water status on the (8) android mobile device in a real-time manner via Wifi connection.

During the unpredictable weather condition, the system responds according to the set parameter values. Once values hit outside the average parameter set, the microcontroller will automatically stop the water pump from changing until the water will turn it into a typical condition.

Block Diagram

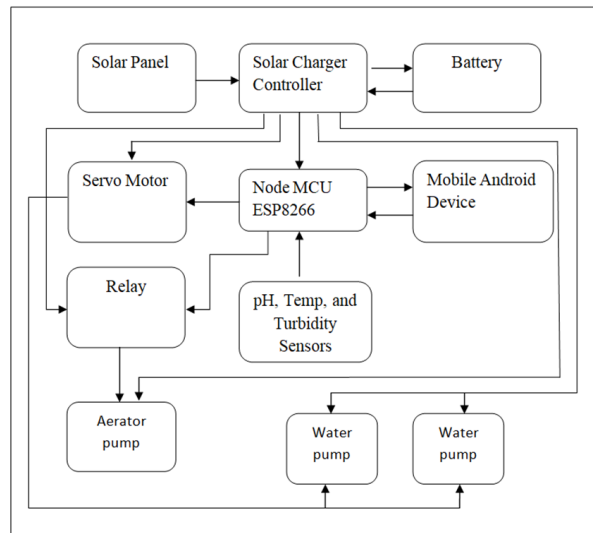


Figure 3. The Block Diagram of the Fish Pond Water Quality Wireless Real-Time Monitoring and Control System.

Figure 3 shows the block diagram of the fish pond water quality wireless real-time monitoring and control system; (1) the solar panel generate electricity through solar energy then connected to (2) solar charger controller that stores electric energy to the battery and acts as the primary distributor of power supply to all components connected

on it (3) the battery supplies power in case solar energy is not stable or available (4) Servo motor controls the (5) water pumps which are in-charge of replacing water in the fishpond. (6) The MCU ESP8266 microcontroller receives data or information from the sensor then process it using a program to determine the status of water quality then; it triggers the relay and servo motor to execute base on the program parameters assigned then sends information about the fishpond water quality status to the (7) Android mobile device. The information receives from the MCU displays in the user interface. (8) The relay controls the (9) aerator pump to mitigate or reduce the temperature of the water. (10) ph sensor measures the ph level or acidity of the water and sends it to the MCU. (11) Also, the temperature sensor measures the temperature of the water and sends it to MCU. (12) Likewise, a turbidity sensor measures the degree of transparency of water due to suspended particulates.

Schematic Diagram

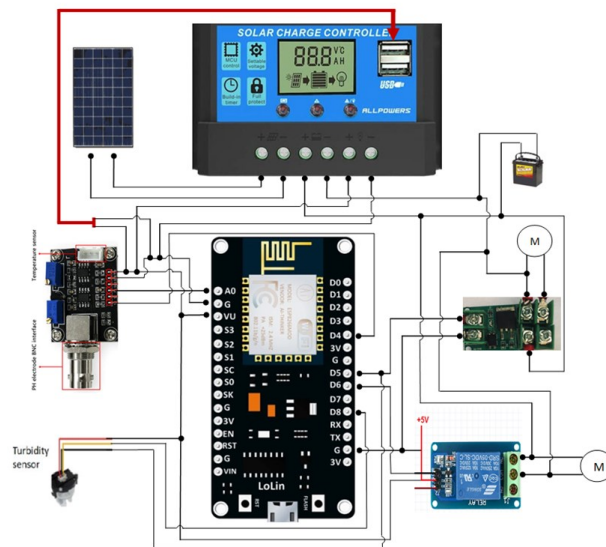


Figure 4. The Fish Pond Water Quality Wireless Real Time Monitoring and Control System Main/Base Unit detailed assembly

Figure 4 shows the fishpond water quality wireless real-time monitoring and control system schematic diagram. It is composed of seven (6) main modules/components: (1) Node MCU ESP8266 with Built Wifi module, (2) pH probe module, (3) temperature sensor, (4) turbidity sensor, (5) relay, and (6) servo motor. Each compo-

nent will be tested based on its functionality and reliability.

The Solar panel is connected to the charger controller indicator to generate electricity, and then the battery will be connected to the charger controller with a 12v indicator. From the MCU pin VU 5v and pin GND connected to the USB port in the charger controller. The ph probe module pin T2 is connected to MCU pin D4, pin PO connected to AO pin, VCC 5v pin connected to 5v VU, pin GND connected to Ground in MCU. The servo motor connects to the 12v into controller and ground, connected to pin D5 with the MCU ground. The relay component connected to the 12v port in the controller, including ground wire, connected to pin D6 with the ground connector, from VU 5v pin is connected to the 5v plug in the relay. The turbidity sensor connects the red wire to pin VU 5v, the orange wire are connected to pin D8, and the blue wire is also connected to D5 in MCU.

The Node MCU ESP8266 controlled these modules through computer programs for data acquisition, processing, and managing. The device's decision-making determines the status and condition of the acquired data. The android tablet device received data through a Wifi connection from three (3) sensors. Simultaneously, the motor drive module and relayed module operate the water pump for changing water and aerator motor to lessen the water temperature while transmitting the data into the android tablet device.

The sensors and the MCU process the water condition data to process and control, and maintain the acquired water. The Wifi Module was used in real-time remote monitoring of the system. There were three (3) conditions based on the BFAR-RFFTC6 reference data, temperature, potential hydrogen, and turbidity for the water conditions critical. There were six specified warning signs (1) temperature below 28c (2) higher 32c, (3) potential hydrogen below 6.5 (4) higher 9.5, and (5) below 30cm (6) higher 30cm. The alarm status would also display on the Android tablet device. The testing of the Main/Base unit was based on the functionality of the major components: Solar charge controller, Node MCU ESP8266, build in wifi module, relay module, motor drive module, pH probe module, and turbidity module.

The Wifi module is the other monitoring of the system; it served as the system's remote/wireless monitoring. The results are shown in the figure below.

Results of System Development

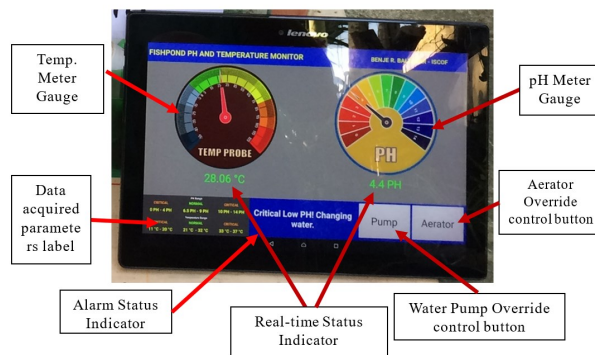


Figure 5. The Graphical User Interface Screen

Figure 5 shows the graphical user interface screen displaying the Water Quality Status. It includes the Temperature gauge that shows the temperature status; ph meter gauge displays the ph level status; data acquired label displays the information from the microcontroller; alarm status indicator button that displays the remarks whether critical or normal the status of water quality; the aerator control button once press automatically execute the relay; and water pump button triggers the water changing process. Pressing the Pump button controls the on/off device operation while pressing the aerator button to override the system's operation.

This means that the system could meet the functions that cover all the specified task and user objectives. The system provides the correct results with a degree of precision.

Table 1. The ISO 25010 Overall Evaluation Summary Result

ISO 25010 Criteria	Mean	Interpretation
Functional Suitability	4.87	Excellent
Performance Efficiency	4.60	Excellent
Compatibility	4.60	Excellent
Usability	4.76	Excellent
Reliability	4.62	Excellent
Security	4.73	Excellent
Maintainability	4.52	Excellent
Portability	4.58	Excellent
Over-all Mean	4.66	Excellent

Summary of Result. As shown in Table 1, the result establishes that the device had “excellent” quality based on the ISO 25010 International Standards. Specifically, it had “excellent” functional suitability (M=4.87), performance efficiency (M=4.60), compatibility (M=4.60), usability (M=4.76), reliability (M=4.62), security (M=4.73), maintainability (M=4.52), and portability (M=4.48).

The result confirmed that the device’s quality conformed to the international standard set by the ISO.

The result revealed that the System device with android mobile application had an excellent quality and performance that can bring satisfaction to its beneficiaries—the application requirements, such as wireless connection and android tablet signal strength.

The study's result confirmed the goal of ISO 25010, which states the quality of a device is the degree to which the system satisfies and uttered its various stakeholders' implied needs, thus providing value (<http://iso2500.com>). Along this line, the "Fish Pond Wireless Real-time monitoring and control system for breeding tilapia" had been developed to promote quality devices and software for stakeholders.

CONCLUSIONS

The conclusions are drawn from the results and the recommendations to further enhance the system device and android mobile application for future researchers.

Based on the results presented, the following conclusions were drawn:

1. The device was successfully designed, developed, and piloted.
2. The system device with an android app accomplished its intended objectives of assisting fisheries personnel in monitoring the temperature, ph, and turbidity to maintain the water condition by automatically changing water using sensors favorable for breeding tilapia.
3. The application conformed to the ISO standards. As expected, the system means that the system is suitable enough for its specific parameter functions and operation.
4. System device with android mobile application had an excellent quality and performance that can bring satisfaction to its beneficiaries

RECOMMENDATIONS

On the bases of the findings and conclusions, the following are hereby recommended:

It is highly recommended that the system be implemented in RFFTC-6 (Regional Freshwater Fisheries Technology Region 6) to help the agency sustain the high distribution of tilapia fingerlings in different LGU's and local small fish farmers in the region for the community livelihood program.

It is recommended to establish a productive partnership that will lead to the achievement of quality education, strong linkages, and technological advancement;

It is recommended for future researchers to upgrade and enhance the system device to run on different platforms.

It is recommended to monitor and assess water quality parameters on a routine basis.

It is recommended to conduct training for BFAR staff on how to operate and maintain the device.

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INTENSIFYING THE IMPLEMENTATION OF TECHNICAL ASSISTANCE TO JUNIOR HIGH SCHOOLS USING APPRECIATIVE INQUIRY

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ABSTRACT

This study aimed to determine the practices of school heads in providing technical assistance in the Public Secondary Schools of Lucena City. It utilized a descriptive design. A survey questionnaire was used among the 190 teachers and 14 school heads. Whereas the researcher utilized focus group discussion among teachers and interviews among school heads to substantiate other data. Weighted Mean and t-test were used as statistical treatments. Based on the results of the survey, the instructional leaders and teachers have a similar perception in assessing the classroom observation practices concerning the components of the STAR Method (Situation, Task, Action, Result). Both groups perceived Action and Result as the highest and the Tasks as the lowest which entails that the indicators under Task are least practiced. The assessment of instructional leaders and teachers on the Appreciative Inquiry stages garnered different results. The teachers and school heads perceived Dream Stage as the least practiced. As to highest, teachers practiced Discover Stage the most while Design Stage for the school heads. There are significant differences in the assessments of the two groups of respondents on the classroom observation practices. Opportunities and challenges were identified in the focus group discussions and interviews. According to the respondents, technical assistance merely focused on teachers' classroom encounters, and the real situation is not captured well. Based on the findings, proposing an enhancement program utilizing Appreciative Inquiry will help instructional leaders intensify the implementation of Technical Assistance.

Keywords: Technical Assistance, STAR Method, Appreciative Inquiry, Opportunities, Challenges, Enhancement Program

INTRODUCTION

Provision of technical assistance is an essential professional help a leader extends to his/her subordinates. If technical assistance is given, establishing a healthy workplace, and producing quality outputs can be assured.

If this happens, the employees will be more engaged in doing their work. They will not work just for compensation or promotion but work for the organization's goal. They are more likely to commit to the work they do which leads to a higher degree of work. This element will yield better results if given priority.

Every institution or organization differs in handling people. The approach and methods used vary depending on the context. These two words, approach, and method are very essential in aiding.

However, these also differ in context. The method is a procedure or process for attaining an object. It is a systematic procedure, technique, or mode of inquiry employed by or proper to a particular discipline or art. While Approach is defined as the way you handle something. If someone likes to face problems head-on to deal with them, that is an example of a direct approach to problems.

That is why this has become the problem that most organizations or institutions are facing today, most institutions don't know how to motivate employees (Ayers, 2020). In addition, Buenafe (2016) stressed that organization tends to neglect the importance of human resource just to meet the demands of the business world, failing to study and analyze the employee's emotions. Failure to address and manage one's emotions in the workplace will lead to stress, burnouts, and absentee-

ism which will further lead to higher rate labor turnovers. This has been supported in the research of Gallup. It revealed that in late 2013, only 13 percent of employees around the world are actively engaged at work, and more than 26 percent are completely disengaged, toxic, and at risk of spreading negativity to others. (Solis, 2020)

This was also the findings of Madinah (2015) that the increasing number of unengaged employees has created a lot of problems for the organization across the globe. On the contrary, the number of engaged employees who are the backbone of the organization is constantly decreasing. This scenario has a big impact on the operations because the employees' performance in an institution would determine where the path of their action would go.

According to Lee (2012), the behaviors make a business's goals and success possible, get more of those behaviors, and more employees who care about you make a valuable contribution. In short, employers must make each employee appreciate their role as part of the larger organizational impact. They must believe the company's mission and know that mission has a greater purpose than adding to the bottom line (retrieved from <https://www.impactgrouphr.com>)

This situation becomes a big challenge among leaders and managers in different organizations which is also encountered by instructional leaders in the field of education who have direct supervision among teachers. They give technical assistance on how a certain task should be done properly to create a conducive workplace and yield the desired outputs or outcomes. Catapang (2017) and Maranan (2017) shared views as regards the importance of providing technical assistance. Accordingly, technical assistance is deemed necessary to ensure the effective program implementation and eventually achievement of higher learning outcomes. Educators must be given technical assistance to enhance their competencies and update their skills.

In addition, the instructional leaders being the pillars of the educational system play as instructional supervisors, communication, resource allocation, and technical assistance provider. They share their knowledge about instruction by observing teachers and providing feedback on how they can improve their instructional and management skills. The assistance they extend to teachers may take the form of pointers or guidelines in lesson planning, tips in the preparation and utilization of instructional materials and other visual aids, innovative methods, and techniques in

teaching, inventory of appropriate evaluation instruments, and methods of controlling classroom routine.

This mandate among instructional leaders is anchored on Executive Order No. 366 issued in October 2004. The implementation of the Rationalization (RAT) Plan has established the formation of 8 functional divisions at the DepEd Regional Office. One of the functional divisions instituted is the FTAD (Field Technical Assistance Division). The goal of FTAD is to strengthen the Schools Division and DepEd Regional Office. It also provides enabling interventions and strategies to Schools Division to help them achieve their goals and targets. The department strengthens and improves technical assistance being provided by the division offices to schools. And in the school level, the school head serves as a TA provider. However, the challenge in giving technical assistance is still at stake because not everybody is comfortable with being observed, monitored, and assessed. According to Geller (2001), a lot of people are not just comfortable with being observed one-on-one. They do not want to be observed and coached by their co-workers. It is best to give these people time to watch the process work and encourage them to join in when they are ready.

Some are afraid of what would be asked of them. Sometimes, the way someone asks questions affects the answers that somebody would give. Usually, the instinct to diagnose the situation is by asking, "What is wrong?" and then developing solutions from there. When someone tries to figure out what went wrong, the tendency is to focus on what is broken. That does not help us clarify what is working well. It does not point us toward a solution. We used to have this Problem-Solving Approach where all the problems are being asked and how to give solutions to the problems. But nowadays, a new approach has been created focusing not on the problems but the strengths of the TA recipients. Aristotle once said that to educate the mind without educating the heart is no education at all. It is important to consider the feelings of the TA recipients. According to Newman (2017), building cultures of gratitude and appreciation can transform our work lives, leading to deeper connections to each other and to the work we are doing.

This gives the idea to the researcher to study a new approach in giving technical assistance among teachers, focusing on strengths and not on weaknesses. In 1990, a new approach known as Appreciative Inquiry was conceived by David

Cooperrider. Appreciative Inquiry is a relatively new theory that takes a positive approach to organizational development. It aims to identify good practices, design effective development plans, and ensure implementation. It focuses the research process on what works, rather than trying to fix what does not.

This approach is also supported by the former Regional Director of Region IV-A (CALABARZON) now serving as Undersecretary of the Department of Education-Curriculum Division, Dr. Diosdado M. San Antonio. As mandated by Regional Memorandum (DepEd 4A-01B-RM-18-550) regarding Measures to Enhance Teacher's Welfare in CALABARZON Public Schools, C.3. The principles of Appreciative Inquiry shall be used in all class observation processes.

In addition, another regional memo was given to the field on the use of Appreciative Inquiry, the DepEd-4A-01-RM-18-628 regarding the Implementation of Learning-Focused School Leadership. It is stated in Domain 3, Providing Technical Assistance (TA) towards Innovative Teaching-Learning Interventions that mandates the use of Appreciative Inquiry in providing Technical Assistance.

As stated in The Basic Education Sector Reform Program Implementation Plan in 2006 (BESRA-PIP) there are different modes of Technical Assistance expected of the Regions and Divisions to their respective clientele. Same with TA that must be given by divisions to schools like stakeholder networking, stakeholders mobilization and resource generation, school-based resource management and installation of finance and administrative systems, development of standards and indicators of the progress of impacts and process, appointment of SBM Coordinator, training programs for school heads and teachers, and procurement of textbooks. It is with these, that the researcher found interest to study Appreciative Inquiry as an approach in giving Technical Assistance among teachers not only in classroom instruction but also in other school-related concerns.

Knowing the advantages of Technical Assistance and Appreciative Inquiry and how they affect recipients of an organization is not enough. Based on the study of Maranan (2017), the study showed that the District Supervisors encountered problems and issues relative to the insufficiency of them on reference, mechanism, and framework of FTA, insufficiency of the capacity building program, and apprehensive attitude of the clients while the school heads encountered issues and

problems relative to insufficiency of financial and material resources and attitude of the clients. Based on the findings and conclusions of her study, the proposed performance coaching plan contained coaching target goals, areas of concern, strategic activities, and coaching feedback mechanism framework which when properly implemented could enhance FTA implementation. She added that capacity-building programs should be continuously enhanced to strengthen the competencies of FTA providers specifically on research, interpersonal skills, and communication skills. The number of high-performing schools is outnumbered by the low-performing ones. This necessitates technical assistance to address the gaps and improve every team member to achieve the expected goal (Maranan, 2017).

Crafting an Enhancement Program was the proposed output of this study. This was also the recommendation of Maranan (2017) that capacity-building programs should be continuously enhanced to strengthen the competencies of FTA providing specifically on research, interpersonal skills, and communication skills. The teachers enjoyed learning and they shared their ideas during technical assistance. Employee development programs are ways to improve an employee's broader skills as a person over an extended time in a more holistic approach. Learning and development opportunities help boost employee engagement and productivity (Tapado, 2018).

Guided by these studies and principles, the researcher attempted to identify the utilization of Appreciative Inquiry in providing technical assistance in the Public Secondary Schools of Lucena City and proposed an Enhancement Program that would suit the context of the school setting.

OBJECTIVES

This study determined the utilization of Appreciative Inquiry in providing technical assistance in the Public Secondary Schools of Lucena City.

Specifically, this study aimed to:

1. Assess the extent of use of classroom observation tool with reference to the following components of STAR Method:
 - 1.1 (S) situation;
 - 1.2 (T) task;
 - 1.3 (A) action; and
 - 1.4 (R) result
2. Determine how the following Appreciative Inquiry processes in providing technical as-

sistance are pursued:

- 2.1 define;
 - 2.2 discover;
 - 2.3 dream;
 - 2.4 design;
 - 2.5 destiny.
3. Compare the assessments of the two groups on the observation tool using STAR Method and on Appreciative Inquiry stages. Determine if there are significant differences.
 4. Identify opportunities and challenges in the provision of Technical Assistance
 5. Propose an Enhancement Program utilizing the Appreciative Inquiry Approach in providing technical assistance.

METHODOLOGY

Research Design

The descriptive research design was utilized in this study as it aimed to assess practices in providing technical assistance among Junior High School Teachers of Lucena City. According to McCombes (2019), the descriptive research design is useful when not much is known yet about the topic or problem.

To gather the needed data, a researcher-made questionnaire was used, supplemented by interviews, and enriched by focus group discussion.

Respondents of the Study

The respondents of the study were the 14 public secondary school heads and 190 teachers at the Schools Division of Lucena City. Since there are only 14 public secondary school heads in Junior High School in SDO Lucena City, all of them were the respondents. Using Slovin's formula, the teacher-respondents were randomly selected to get the sample size.

Respondents	Number
Secondary School Heads	14
Secondary School Teachers	190

Data Gathering Instrument

Interview guide and questionnaire were used to gather the necessary data for the study. The items on the questionnaire were based on the Classroom Observation Tool utilized by the supervisors in giving technical assistance to school heads while the items for the Appreciative Inquiry were based on the assumptions on the use of Appreciative Inquiry as used in the study of Buchanan (2014). However, the items were modified to

suit the purpose of the study. Likewise, this study included an interview and focus group discussions (FGD) to further substantiate the gathered responses.

Questionnaire. The study utilized a questionnaire as the main data gathering instrument. Interviews and FGDs were also considered in gathering information about the study. The data gathering instrument used was based on readings and previous similar studies. This underwent thorough validation by research experts, panel members, and thesis adviser. Their comments and suggestions regarding the face and content of the instrument were considered.

Construction. Relevant books, journals, memoranda, theses, and dissertations were reviewed to gain insights on concepts related to the study.

Validation. After having been reviewed by the thesis adviser, the questionnaire was then subjected to validation. The panel members validated the questionnaire together with the interview guide. The final approval was decided by the dean of CTE.

Administration. After the validation, the final copy was reproduced and personally distributed by the researcher among the respondents after securing approval from the superintendent and school heads concerned.

Scoring of responses. A four-point pattern from Likert's was used to score responses to the questionnaire items. The score of each item was given a corresponding weight value, with 1 as the lowest and 4 as the highest. Descriptive verbal descriptions were provided for the interpretation of the results.

Scale	Scale Range	Verbal Interpretation
4	3.50-4.00	Great Extent (GE)
3	2.50-3.49	Moderate Extent (ME)
2	1.50-2.49	Slight Extent (SE)
1	1.00-1.49	Least Extent (LE)

Interview. The interview guide was developed for this study. The researcher conducted interviews among the school heads. They were asked whether they are familiar with utilizing Appreciative Inquiry as an approach in providing technical assistance. They were also asked about the assistance they received from authorities. Another was the approach that the provider used in giving TA. The challenges and opportunities that were encountered in the implementation of TA were also asked. How the TA produced the needed change and the relevance of it to the recipients was also asked.

Focus Group Discussion. FGD was used to gather additional data that would support the findings of the study. This was conducted among selected Junior High School teachers of SDO Lucena City. They were asked the same questions that were given to school heads. The objective of this was to know the perspective of the teachers in terms of receiving technical assistance.

Data Gathering Procedure

A letter of request to conduct the study was given to the superintendent of SDO Lucena City to allow the researcher to conduct the study among the 14 public secondary school heads of Lucena City. The heads of each school answered the questionnaire that was based on the monitoring tool on Classroom Observation of SDO Lucena and adapted the checklist on Appreciative Inquiry by Buchanan. Likewise, the researcher sought the permission of the school heads for the conduct of the research among teachers. They were interviewed to assess the practice of providing technical assistance among Junior High School teachers. Focus Group discussion was also used among teachers to corroborate the data gathered using the validated questionnaire.

Statistical Treatment of Data

To interpret the data collected, the following statistical tools were used to answer the research questions.

Weighted Mean. This showed the average of responses among the items in the STAR Method and Appreciative Inquiry Approach.

T-test. This determined the significant difference between the assessments by the two groups of respondents, the teachers, and school heads

FINDINGS

Table 1. Summary on the Use of Classroom Observation in terms of STAR Method

Items	Teachers		School Heads	
	W.M.	V.I.	W.M.	V.I.
Situation	3.64	GE	3.89	GE
Task	3.60	GE	3.84	GE
Action	3.66	GE	3.94	GE
Result	3.66	GE	3.94	GE
Composite Mean	3.64	GE	3.90	GE

Legend: GE=Great Extent

The STAR Method is a procedure taught to help people provide thoughtful answers that contain fully formed beginnings, middles, and ends. Table 1 shows the summary of the components of

the STAR Method in the conduct of classroom observation. It could be gleaned from the result that each component was being practiced by both respondents to the great extent with a composite mean of 3.64 for the teachers and 3.90 for the school heads. The components, Results, and Actions got the highest, and Tasks got the lowest. Result and Action have the WM 3.66 as assessed by the teachers. While among school heads Result and Action got 3.94 WM. Whereas the Task got 3.60 for the teachers and 3.84 for the school heads.

It could be gleaned from the responses that the component Task was not practiced well since it gained the lowest assessment. Eilers (2019) and Boogard (2020) stated that Task deals with what goals were working on and what responsibility was in that situation. It shows that the goal of the observation was not clearly defined between the teacher and the instructional leader.

According to Catapang (2017), to achieve the goal of effective supervision is to advise, assist and support teachers. Instructional leaders likewise inspect, control, and evaluate teachers with the motive that effective instructional leadership impacts positively on teacher motivation, satisfaction, self-esteem, efficacy, teacher's sense of security, and their feelings of support. Generally, teacher supervision and support strategies to ensure the quality of teaching and learning.

Table 2. Summary of Responses on Appreciative Inquiry Stages

Stages	Respondents	Mean	t-value	p-value	Decision on H0	Interpretation
Define	Teachers	3.58	-3.27	0.0042	Reject	Significant
	School Heads	3.83				
Discover	Teachers	3.62	-6.0557	0.0000018	Reject	Significant
	School Heads	3.92				
Dream	Teachers	3.54	-3.041	0.0074	Reject	Significant
	School Heads	3.79				
Design	Teachers	3.61	-8.281	0.00000000012	Reject	Significant
	School Heads	3.96				
Destiny	Teachers	3.57	-6.48	0.00000037	Reject	Significant
	School Heads	3.90				

Legend: GE=Great Extent

Table 2 presents the summary of responses on Appreciative Inquiry Stages. It can be seen from the Table that the computed t – value of -3.27 yielded a value of 0.0042 which is less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected. Thus, there

is a significant difference between the assessment of school heads and teachers' Define Stage. The table also shows that the school heads assessed this stage higher than the teachers with a composite mean of 3.83 interpreted as to a great extent.

For the Discover Stage, the computed t – value of -6.0557 yielded a value of 0.0000018 which is less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected. Thus, there is a significant difference between the assessment of school heads and teachers' Discover Stage. The table also shows that the school heads assessed this stage higher than the teachers with a composite mean of 3.92 interpreted as to a great extent.

Dream Stage has a computed t – value of -3.041 which yielded a value of 0.0074 which is less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected. Thus, there is a significant difference between the assessment of school heads and teachers' Dream Stage. The table also shows that the school heads assessed the Dream stage higher than the teachers with a composite mean of 3.79 interpreted as to a great extent.

The next stage is the Design Stage which has a computed t – value of -8.281 which yielded a value of 0.0000000012 which is less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected. Thus, there is a significant difference between the assessment of school heads and teachers in the Design Stage. The table also shows that the school heads assessed this stage higher than the teachers with a composite mean of 3.96 interpreted as to a great extent.

The last stage is Destiny which has a computed t – value of -8.281 which yielded a value of 0.0000000012 which is less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected. Thus, there is a significant difference between the assessment of school heads and teachers' Destiny Stage. The table also shows that the school heads assessed this stage higher than the teachers with a composite mean of 3.90 interpreted as to a great extent.

Based on the results, there is a significant difference between the assessment by the two groups on the observation tool using STAR Method and on Appreciative Inquiry stages. This entails that the respondents view the indicators based on their experiences relative to their position. With these results, the output of the study which was crafting an Enhancement Program was needs-based according to the answers of the respondents. How to

use Appreciative Inquiry in giving Technical Assistance was the focus of this study. The contents of the output focused on the indicators that got the lowest weighted mean. Because this entailed that the indicators were least given focus or practice.

Based on the result of the focus group discussion with the teachers and interview with the school heads, they are not aware of using Appreciative Inquiry. According to them, they do not know how Appreciative Inquiry is being done. However, school heads are aware that this is a mandate of the region to utilize in classroom observation and in giving Technical Assistance.

They identified Opportunities such as Availability of monitoring tools particularly on the use of STAR Method, Provision of Technical Assistance has become an integral part of classroom observation, Teachers' attitude and appreciations could affect the success of the Technical Assistance Implementation, Technical Assistance should address the need with relevance to gaps on teachers in rendering quality instructions.

When asked about the challenges encountered in giving Technical Assistance, respondents mentioned the following challenges: The efficiency and effectiveness of the Technical Assistance provided by the observer is not yet felt; Technical Assistance is usually done through a checklist approach, the real situation is not captured well; Over familiarity between the observer and the observee; Instructional exposure of the observer; Technical know-how on how to deal with improving the teacher observed in terms of showcasing the prescribed observable indicators; Some strategies may not be effective and efficient; Provision of new information; Challenge in conducting follow-up; Technical Assistance given merely focused on classroom encounter.

How to utilize the approach in giving technical assistance is the prime objective of this study. According to Light (2016), the participants' attitudes had a clear influence on their experiences of and success negotiating constraints. Most of the participants approached most of the constraints identified with a can-do vision, treating them as routine obstacles not anomalous or non-negotiable barriers. Their attitudes also influenced their identification of objectives. The most positive participants tended to set the broadest objectives, confronting the most constraints and assuming that they would be able to negotiate those constraints and reach their objectives.

According to Strauss (2011), change a few habits and people might be wondering how you get so many opportunities. You don't need luck if

you can make things happen, you need a strategy. Strategy is a realistic plan to move forward by taking advantage of the opportunities of your unique abilities. It is a matter of having control.

Summary of Findings

Based on the responses of the teachers and school heads, the following are the findings of the study.

1. The first objective of this research is to assess the use of classroom observation tools by the instructional leaders and teachers with reference to the components of the STAR Method such as Situation, Task, Action, and Result. It could be gleaned from the result that among the components of the STAR Method the least practice is the Task. Whereas Results and Actions got the highest which implies that these two components were given more focus by the school heads.
2. The second objective is to determine how are the Appreciative Inquiry stages namely define, discover, dream, design, and destiny in providing technical assistance pursued. The teachers perceived the indicators in the Discover Stage as the highest while Design Stage for the school heads. Whereas, both respondents viewed the indicator Encourage to take risk as the least practice in the Dream Stage.
3. The third objective is to compare the assessments of the two groups on the observation tool using STAR Method and on Appreciative Inquiry stages and to determine if there are significant differences. Based on the summary of responses of teachers and school heads on the observation tool using STAR Method, the computed t – value yielded a p – value that is less than 0.05 level of significance.

This indicates that the null hypothesis of no significance is rejected. This is the result of all components of the STAR Method. Thus, there are significant differences between the assessments of school heads and teachers on the observation tool with reference to the components.

Whereas, for the result on Appreciative Inquiry Stages, there is a significant difference between the assessment of school heads and teachers in all the stages of Appreciative Inquiry. The computed t – values yielded p – values that are less than 0.05 level of significance. This shows that the null hypothesis of no significance is rejected.

Based on the results, the researcher found

out that there is a significant difference between the assessments by the two groups on the observation tool using STAR Method and on Appreciative Inquiry Stages. This implies that they perceived the indicators differently based on their positions and experiences.

4. The fourth objective is to identify opportunities and challenges in the use of the Appreciative Inquiry approach. The researcher utilized FGD among teachers and interviews among school heads to gather data. Based on the result of the focus group discussion with the teachers and interview with the school heads, the identified opportunities were availability of monitoring tools particularly on the use of STAR Method, provision of Technical Assistance has become an integral part of classroom observation, teachers' attitude and appreciations could affect the success of the Technical Assistance Implementation and Technical Assistance should address the need with relevance to gaps on teachers in rendering quality instructions.

Whereas the respondents mentioned the following challenges: the efficiency and effectivity of the Technical Assistance provided by the observer are not yet felt; Technical Assistance is usually done through a checklist approach; the real situation is not captured well; over familiarity between the observer and the observee; instructional exposure of the observer; the observer should develop his technical know-how on how to deal with improving the teacher observed in terms of showcasing the prescribed observable indicators; realization that some strategies may not be effective and efficient; provision of new information; follow up must be conducted so that the changes will be thoroughly identified; the Technical Assistance given merely focused on the improvement of teacher's classroom encounter.

5. The fifth objective is to propose an Enhancement Program utilizing the Appreciative Inquiry Approach in providing Technical Assistance. The proposed Enhancement Program aims to intensify the provision of technical assistance. The focus of the program was based on the least practice indicators as a result of the assessment of the respondents.

CONCLUSIONS

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

1. The instructional leaders and teachers have the same perception in assessing the classroom observation tool with reference to the components of the STAR Method. Both respondents perceived Results and Action as the highest and the Tasks as the lowest. Eilers (2019) and Boogard (2020) stated that Task deals with what goals were working on and what responsibility was in that situation. Based on the assessment of the respondents, the goal of the observation was not clearly defined between the teacher and the instructional leader.
2. It could be gleaned that the respondents viewed the stages similarly for the lowest and differently for the highest. The teachers and school heads perceived Dream Stage as the lowest. As to highest, teachers practice Discover Stage the most while Design Stage for the school heads. The indicator Encourage to take risk got the lowest among respondents which imply that the instructional leader does not inspire teachers to go beyond and do things out of their comfort zones.
3. There are significant differences in the assessment of the two groups of respondents on the observation tool based on the STAR Method and on Appreciative Inquiry stages. The position and experiences of the respondents have something to do with their assessment. The method used as indicated in the classroom observation tool and the approach used as reflected in the indicators for each stage entail differences.
4. The responses of the school heads and teachers are indicators that there is a need to intensify the provision of Technical Assistance. The identified opportunities and challenges served as bases for output conceptualization.
5. Based on the findings, the researcher proposed an Enhancement Program using the Appreciative Inquiry Approach to intensify the implementation of Technical Assistance.

ENHANCEMENT PROGRAM IN PROVIDING TECHNICAL ASSISTANCE USING APPRECIATIVE INQUIRY APPROACH

Introduction

An Enhancement Program is an important tool or strategy to realize the goals of an organization or institution. This serves as a road map to lead them to the right path. It is an ongoing and continuous process that needs the full cooperation and participation of employees to succeed. It is said that change is inevitable since change is the only constant thing in this world which is why continuous improvement should continue to evolve. The developmental needs of employees change so the program must be changed as well.

In crafting the training program, the goals are set, and the objectives are identified based on the needs of the respondents. Program planning also allows us to identify shortcomings and weaknesses and chart a new course of action should priorities and needs change. Not only does the planning process allow us to keep track of where we have been, but also continues to guide us in the direction we should be going. It tells us where we intend to go next. This enhancement program catered to the least practiced indicators based on the results of the survey. Utilizing the indicators from the Appreciative Inquiry Stages as topics in the series of sessions was considered.

Goals and Objectives

1. To define what specifically is desired, in relation to an already-existing positive feature of a person or organization
2. To explore their own account of their strengths and successes and how they feel about them.
3. To discuss experiences that inspired, stimulated, and motivated them.
4. To identify one another's dreams and looking into personal positive assets may be considering reaching a given goal, in the context of a creative and empathetic conversation.
5. To determine what should be aimed for, most optimistically, based on uncovered capacities, to set up an ideal picture of what the future could look like.

STAGE	FOCUS		ACTIVITY
	SCHOOL HEAD	TEACHER	
Define Stage	Seek the best outcome in a difficult situation Identify and redefine problems into possibilities Help others see possibilities by articulating what they want vs. what they do not want	Look at all sides of an issue Identify and redefine problems into possibilities Help others see possibilities by articulating what they want vs. what they do not want	List down what they want for themselves and for the organization
Discover Stage	Draw attention to what is working here Shift a conversation about a problem into a conversation about a possibility Ask people to describe peak experiences from the past Express when seeing something positive	See other people and situations with appreciation Ask positive questions in everyday conversations Draw attention to “what is working here”	Engage in Appreciative Interviews Reflect on interview highlights Acknowledge individual and collective
Dream Stage	Believe in myself even when others do not Encourage to take risk	When told something is not possible, I ask “why not?? Encourage to take risk Put fear and worry aside and envision the best possible outcome, when faced with a challenge	Share dreams collected during interviews Create and present dramatic enactments Visualize the organization and own contributions in 3-5 years
Design Stage	Make a personal commitment to mutual success in my relationships with others	Make a personal commitment to mutual success in my relationships with others Collaborate with others sincerely Question commonly accepted definitions and go beyond previous assumptions	Draft provocative propositions (design statements) incorporating the positive core
Destiny Stage	Trust in intuition in times of uncertainty Prosper in ambiguity more than certainty Encourage “what if” conversations with groups to see where they lead	Prosper in ambiguity more than certainty Trust in intuition in times of uncertainty Encourage “what if” conversations with groups to see where they lead	Publicly declare intended action Self-organized groups plan on the next step

TRAINING MATRIX FOR SCHOOL HEADS AND TEACHERS					
Time	Day 1	Day 2	Day 3	Day 4	Day 5
7:00-7:15	Arrival	Arrival	Arrival	Arrival	Arrival
7:15-8:00	Opening Program & Training Overview	Management of Learning	Management of Learning	Management of Learning	Management of Learning
8:00-9:00	Session 1: Technical Assistance	Session 1: Discover Stage Draw attention to what is working here	Session 1: Dream Stage Believe in myself even when others do not	Session 1: Design Stage Make a personal commitment to mutual success in my relationships with others	Session 1: Destiny Stage Trust in intuition in times of uncertainty
	9:00-10:00	Session 2: Technical Assistance	Session 2: Discover Stage Shift a conversation about a problem into a conversation about a possibility	Session 2: Dream Stage Encourage to take risk	Session 2: Design Stage Collaborate with others sincerely
10:00-10:30	Break	Break	Break	Break	Break
10:30-11:30	Session 2: Background of Appreciative Inquiry	Session 3: Discover Stage Ask people to describe peak experiences from the past	Session 3: Dream Stage When told something is not possible, I ask “why not??	Session 3: Design Stage Question commonly accepted definitions and go beyond previous assumptions	Session 3: Destiny Stage Encourage “what if” conversations with groups to see where they lead
	11:30-12:00	Session 3: Stages of Appreciative Inquiry			
12:00-1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00-2:00	Session 4: Define Stage Seek for the best outcome in a difficult situation	Session 4: Discover Stage Express when seeing something positive	Session 4: Dream Stage Put fear and worry aside and envision the best possible outcome, when faced with a challenge	Demo-Interview	Demo-Interview
	2:00-2:30	Session 5: Define Stage Identify and redefine problems into possibilities	Session 5: Discover Stage See other people and situations with appreciation		
2:30-3:00	Break	Break	Break	Break	Break

3:00-3:30	Session 6:	Activity:	Activity:		
	Define Stage	Engage in Appreciative Interviews	Create and present dramatic enactments	Demo-Interview	Demo-Interview
	Help others see possibilities by articulating what they want vs. what they do not want	Demo-Interview			
3:30-4:00					
4:00-4:30	Session 7:	Activity:	Activity:	Sharing of insights	Sharing of insights
	Define Stage	Reflect on interview highlights	Visualize the organization and own contributions in 3-5 years		
	Look at all sides of an issue	Acknowledge individual and collective			
4:30-5:00	Activity:	Activity:	Activity:	Reflective Writing	Closing Program
	List down what they want for themselves and for the organization	Reflective Writing	Reflective Writing		

Sample Questions for Demo-Interview:

1. What is it that you love most about your personal life or career?
2. What is it that fundamentally drives you in life, and persists in your career or personal endeavors?
3. What talents do you have that you are most grateful for?
4. How have they helped you get where you are today?
5. What influences have inspired you throughout your life? In what ways have they provided you with existential guidance and a mental framework to develop your best self?
6. What purpose do you most wish to fulfill in your career or personal life?
7. What is it that you can start doing today that will increase the likelihood of making these wishes would come true?

RECOMMENDATIONS

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

1. Intensify the provision of Technical Assistance, particularly on the identified challenges and least practice indicators.
2. The listed opportunities can be used for further enhancement of the program.
3. Utilize Appreciative Inquiry Approach in implementing Technical Assistance to provide new opportunities.
4. Similar studies may be conducted in other schools to determine the effectiveness of providing technical assistance using the Appreciative Inquiry Approach.

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MULTIPLE INTELLIGENCES, LEARNING STYLES, AND ACADEMIC PERFORMANCE OF FIRST YEAR COLLEGE STUDENTS

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ABSTRACT

This study was conducted during the first semester of AY 2018-2019 to determine the multiple intelligences, learning styles, and academic performance of first year college students of Capiz State University Burias Campus. The respondents of the study were the 153 first year college students selected through simple random technique. This descriptive-correlational research made use of adopted questionnaire to collect data which were then analyzed using descriptive and inferential statistics and results were interpreted at 0.05 level of significance. Results of the study revealed that first year college students perceived themselves to have “high” multiple intelligences, they have varied learning styles and they have an “advanced” academic performance. The level of multiple intelligences of the respondents, did not significantly differ when they were grouped according to age, sex, parents’ education, family structure, and place of residence. The level of learning styles of the respondents did not significantly differ when they were grouped according to age, sex, parents’ education, family structure, and place of residence. Multiple intelligences and learning styles of students were found significantly related to each another. Further, academic performance was significantly influenced by the respondents’ different multiple intelligences such as visual, existentialist, musical/rhythmic, math/logical, and intrapersonal. Lastly, the academic performance of the first year college students was significantly influenced by their visual and auditory learning styles. This study recommended the following: The curriculum planner must be consider to the students’ different dimensions of multiple intelligences in planning the curriculum. The administrators, specialists, and teachers must pattern the different strategies and techniques in teaching to the level of the learners. Teachers must provide varied assessments to reinforce advanced performance of students. Performance of students must improve if they are in their ideal age of being a first year college students. Teachers must consider the sex preference of the students in conducting assessments. Integration of different dimensions of multiple intelligences and varied modalities of learning style to enhance performance of students. Facilitators must incorporate different multiple intelligences into the daily plans to improve students’ performance. Finally, Incorporating learning styles into daily lesson plans to improve students’ self-esteem, retention rates, motivation towards learning and incidence of off-task behaviors .

Keywords: multiple intelligence, learning styles, academic performance, visual, auditory, existentialist

INTRODUCTION

The Master Plan for Basic Education provides the modernization of basic education in the country. The education reform movement of recent years has spawned the search for innovative approaches to teaching. One theory that has impacted the design of many schools and curricula is the theory of Multiple Intelligences (MI) posited by Gardner (1983). Another factor considered playing major varied roles in facilitating teaching–

learning process is the teacher. They are expected to employ teaching styles to cater the learning needs of the students for them to learn much from the classroom instruction.

The millennial students are learning differently at their own pace and styles. Some of them learn best through reading, others best comprehend through writing. Other students have outstanding performance in manipulating things while, others excel in finding a solution to a complex problems. With these realities, teachers must

shift the traditional chalk and talk way of teaching to a facilitative method to meet the varied needs and styles of the students in the classroom.

Students may have varied multiple intelligences and preferred learning styles and the teacher should know how individual differences of students reflect these modalities manifested by the students in their learning. Hence, this study.

This study was conducted to answer the following questions:

1. What is the level of multiple intelligences of the respondents as a whole and in terms of the following dimensions: visual-spatial, verbal-linguistic, mathematical/ logical, bodily-kinesthetic, musical/ rhythmic, intrapersonal, interpersonal, naturalist, and existentialist?
2. What is the level of learning styles of the respondents as a whole and in terms of the following modalities: visual, auditory, reading/writing preference, and kinesthetic/tactile?
3. What is the academic performance of the respondents as a whole, as entire group and when classified according to age, educational attainment of parents, family structure, place of residence, and sex?
4. Are there significant differences in the multiple intelligences, learning styles and academic performance when respondents are grouped according to age, educational attainment of parent, family structure, place of residence, and sex?
5. Are multiple intelligences, learning styles, and academic performance significantly related to one another?

METHODOLOGY

The respondents of the study were the 153 first year college students of Capiz State University Burias Campus during the First Semester of AY 2018-2019 selected through simple random technique using the formula of Cochran.

Data were gathered using a survey questionnaire consisting of three (3) parts. It gathered information about the respondent's profile; a 90-item scale on multiple intelligences; and a questionnaire for learning styles consisting of 40 statements. The instruments used to measure the multiple intelligences and learning styles were adapted from Mckenzie (2014). Data were analyzed using Statistical Package for Social Sciences (SPSS) software and results were interpreted at 0.05 level of significance.

RESULTS AND DISCUSSION

Profile of the Student-Respondents

The results of the study revealed that most of the first year college students of Capiz State University is dominated by female, age between 17 – 19 years, parents obtained elementary level of education, with nuclear family structure, and living in barangay.

Table 1. Profile of The Respondents

Variables	FREQUENCY	PERCENT
Sex		
Male	46	30.07
Female	107	69.93
Age		
17 – 19 years old	86	56.21
20 – 22 years old	49	32.03
23 – 25 years old	18	11.76
Mother's Education		
Elementary Level	37	24.18
Elementary Graduate	19	12.42
High School Level	25	16.34
High School Graduate	32	20.92
College Level	23	15.03
College Graduate	17	11.11
Father's Education		
Elementary Level	48	31.37
Elementary Graduate	23	15.03
High School Level	13	08.50
High School Graduate	36	23.53
College Level	21	13.73
College Graduate	12	07.84
Family Structure		
Nuclear	83	54.25
Solo Parent	11	07.19
Extended Family	59	38.56
Place of Residence		
Poblacion	35	22.88
Barangay	118	77.12
TOTAL	153	100.00

Respondents' Level of Multiple Intelligences

The results on multiple intelligences of the respondents are reflected in Table 1. It is shown that as a whole the multiple intelligences of the respondents were "high" (Mean = 3.87). Less than three-fourths (70.59%) had "high" level of multiple intelligences; 18.95 percent, "very high" and 10.46 percent, "moderated". It implies that the students had high combination of multiple intelligences when taken as a whole.

Table 1. Multiple intelligences of the respondents taken as a whole

MULTIPLE INTELLIGENCES	FREQUENCY	PERCENT
Very High	29	18.95
High	108	70.59
Moderate	16	10.46
TOTAL	153	100.00
Mean = 3.87 (High)		

Respondents' Level of Multiple Intelligences by Dimensions

Table 1a presents the multiple intelligences of business administration student - respondents by dimensions. The findings revealed that the student-respondents were highly existentialist (M=3.90), highly kinesthetic (M=3.86), highly intrapersonal (M=3.82), highly Mathematical/logical (M=3.76), highly naturalist (M=3.72), highly interpersonal (M=3.70), highly visual (M=3.62), highly verbal-linguistic (M=3.57) and highly musical (M=3.51). It can be implied that the first year business administration students had high combination of multiple intelligences by dimension. Based on the responses given, the highest weighted mean was obtained from the statement indicators for existentialist in multiple intelligences. It can be said that the respondents enjoy discussing questions about life, viewing art work, important for them to feel connected to people, ideas and beliefs, travelling to visit inspiring places, and learning new things easier when they see their real world application.

Table 1a. Multiple intelligences of the business administration student-respondents by dimensions.

MI DIMENSIONS	MEAN (M)	VERBAL INTERPRETATION
Existentialist	3.90	High
Bodily-Kinesthetic	3.86	High
Intrapersonal	3.82	High
Musical/Rhythmic	3.76	High
Naturalist	3.76	High
Interpersonal	3.70	High
Visual-Spatial	3.62	High
Verbal-Linguistic	3.57	High
Math/Logical	3.51	High
As a Whole	3.72	High

Table 1b reflects the multiple intelligences of agriculture student - respondents by dimensions. As indicated in the table, the respondents were highly kinesthetic (M=4.16), highly existentialist (M=4.11), highly intrapersonal (M=4.05), highly interpersonal (M=4.01), highly visual (M=3.99), highly musical (M=3.97), highly naturalist (M=3.82), highly verbal-linguistic (M=3.81) and highly mathematical/logical (M=3.51). It implies

that the first year agriculture student - respondents had high combination of multiple intelligences by dimension. Based on the responses given, the highest weighted mean was obtained from the statement indicators for bodily/kinesthetic in multiple intelligences. It can be said that the students enjoy making things with their hands, sports are of their life, hands-on activities are fun, they like to work with tools, and they learn by doing.

Table 1b. Multiple intelligences of the agriculture student-respondents by dimensions

MI DIMENSIONS	MEAN (M)	VERBAL INTERPRETATION
Bodily-Kinesthetic	4.16	High
Existentialist	4.11	High
Intrapersonal	4.05	High
Interpersonal	4.01	High
Visual-Spatial	3.99	High
Musical/Rhythmic	3.97	High
Naturalist	3.82	High
Verbal-Linguistic	3.81	High
Math/Logical	3.79	High
As a Whole	3.72	High

Table 1c presents the multiple intelligences of the agricultural and biosystems engineering student - respondents by dimensions. The data revealed that the respondents were highly naturalist (M=4.18), highly existentialist (M=4.13), highly musical (M=3.97), highly intrapersonal (M=3.87), highly interpersonal (M=3.71), highly mathematical and highly kinesthetic (M=3.65), highly visual (M=3.63), and highly verbal-linguistic (M=3.49). It implies that the first year agricultural and biosystem engineering student - respondents had high combination of multiple intelligences by dimension. Based on the responses given, the highest weighted mean was obtained from the statement indicators for naturalist in multiple intelligences. It can be said that the respondents enjoy studying biology, botany, and/or zoology; ecological issues are important to them; enjoyed working in a garden; and enjoyed categorizing things by common traits.

Table 1c. Multiple intelligences of the agriculture and biosystems engineering student-respondents by dimensions

MI DIMENSIONS	MEAN (M)	VERBAL INTERPRETATION
Naturalist	4.18	High
Existentialist	4.13	High
Musical/Rhythmic	3.97	High
Intrapersonal	3.87	High
Interpersonal	3.71	High
Math/Logical	3.65	High
Bodily-Kinesthetic	3.65	High
Visual-Spatial	3.63	High
Verbal-Linguistic	3.49	High
As a Whole	3.72	High

Table 1d presents the multiple intelligences of the education student - respondents by dimensions. As indicated in the table, the respondents were highly existentialist (M=4.18), highly musical (M=4.07), highly intrapersonal (M=3.99), highly visual, highly verbal-linguistic, and highly naturalist (M=3.97), highly interpersonal (M=3.90), highly kinesthetic (M=3.86), and highly mathematical-logical (M=3.84). It implies that the first year education student - respondents had high combination of multiple intelligences by dimension. Based on the responses given, the highest weighted mean was obtained from the statement indicators for existentialist in multiple intelligences. It can be inferred that the respondents enjoy discussing questions about life, viewing art work, important for them to feel connected to people, ideas and beliefs, travelling to visit inspiring places, and learning new things easier when they see their real world application.

Table 1d. Multiple intelligences of the education student-respondents by dimensions.

MI DIMENSIONS	MEAN (M)	VERBAL INTERPRETATION
Existentialist	4.18	High
Musical/Rhythmic	4.07	High
Intrapersonal	3.99	High
Visual-Spatial	3.97	High
Verbal-Linguistic	3.97	High
Naturalist	3.97	High
Interpersonal	3.90	High
Bodily-Kinesthetic	3.86	High
Math/Logical	3.84	High
As a Whole	3.72	High

Respondents' Level of Learning Styles

The results on learning styles of the student - respondents are reflected in Table 2. It is shown that as a whole the learning styles the respondents were high (M=3.78). More than three-fifths (68.63%) had "high" learning styles"; 17.00 percent, "very high" and 14.37 percent, "moderate" learning styles. The computed standard deviation value equals to 0.40 reflects a variation in the level of learning styles of the respondents.

Table 2. Learning styles of the respondents taken as a whole.

MULTIPLE INTELLIGENCES	FREQUENCY	PERCENTAGE
Very High	26	17.00
High	105	68.63
Moderate	22	14.37
TOTAL	153	100.00
Mean = 3.77 (High)	SD = 0.40	

Respondents' Level of Learning Styles by Modalities

Table 2a reveals the learning styles of business administration student - respondents by modalities. The findings showed that the learning styles of the respondents were a combination of reading/writing (M=3.81), kinesthetic/tactile (M=3.71), visual (M=3.63) and auditory (M=3.60). The data revealed that the students had the same level of learning styles which is high in different modalities. Based on the responses given, the highest weighted mean was obtained from the statement indicators for reading/writing learning style which could mean that the most preferred learning style of the said students was reading/writing. It can be inferred that the students learn best if they follow written instructions better than oral ones, they tend to take notes during verbal discussion/lecture, preferred to read a story than to listen to it, and like written directions than spoken ones.

Table 2a. Learning styles of the business administration student-respondents by modalities

LS MODALITIES	MEAN (M)	VERBAL INTERPRETATION
Reading/Writing	3.81	High
Kinesthetic/Tactile	3.71	High
Visual	3.63	High
Auditory	3.60	High
As a Whole SD = 0.40	3.69	High

Table 2b reveals the learning styles of agriculture student - respondents by modalities. The findings showed that the learning styles of the respondents were a combination of reading/writing (M=4.03), kinesthetic/tactile (M=3.89), auditory (M=3.87) and visual (M=3.60). The data revealed that the students had the same level of learning styles which is high in different modalities. Based on the responses given, the highest weighted mean was obtained from the statement indicators for reading/writing learning style which could mean that the most preferred learning style of the said students was reading/writing. It can be inferred that the students learn best if they follow written instructions than oral ones, they tend to take notes during verbal discussion/lecture, prefer to read a story than to listen to it, and like written directions than spoken ones.

Table 2b. Learning styles of the agriculture student-respondents by modalities.

LS MODALITIES	MEAN (M)	VERBAL INTERPRETATION
Reading/Writing	4.03	High
Kinesthetic/Tactile	3.89	High
Auditory	3.87	High
Visual	3.80	High
As a Whole SD = 0.38	3.89	High

Table 2c reveals the learning styles of the agricultural and biosystems engineering student - respondents by modalities. The findings showed that the learning styles of the respondents were a combination of reading/writing (M=3.94), visual (M=3.82), kinesthetic/tactile (M=3.72) and auditory (M=3.60). The data revealed that the students had the same level of learning styles which is high in different modalities. Based on the responses given, the highest weighted mean was obtained from the statement indicators for reading/writing learning style which could mean that the most preferred learning style of the said students was reading/writing. It can be inferred that the students learn best if the students follow written instructions than oral ones, they tend to take notes during verbal discussion/lecture, prefer to read a story than to listen to it, and like written directions than spoken ones.

Table 2c. Learning styles of the agriculture and biosystems engineering student-respondents by modalities

LS MODALITIES	MEAN (M)	VERBAL INTERPRETATION
Reading/Writing	3.94	High
Visual	3.82	High
Kinesthetic/Tactile	3.72	High
Auditory	3.60	High
As a Whole SD = 0.30	3.78	High

Table 2.d reveals the learning styles of education student - respondents by modalities. The findings showed that the learning styles of the respondents were a combination of kinesthetic/tactile (M=3.82), auditory (M=3.81), visual (M=3.79) and reading/writing (M=3.76). The data revealed that the students ha the same level of learning styles which is high in different modalities.

Based on the responses given, the highest weighted mean was obtained from the statement indicators for kinesthetic/tactile learning style which could mean that the most preferred learn-

ing style of the said students was kinesthetic/tactile. It can be inferred that the said students learn best if they participate in an activity to learn how to do it, they work skillfully with their hands to make or repair things, they were skillful at designing graphs, charts, and other visual displays, they excel at sports, and they preferred to experiment than to find the best way to do things.

Table 2.d Learning styles of the education student-respondents by modalities

LS MODALITIES	MEAN (M)	VERBAL INTERPRETATION
Kinesthetic/Tactile	3.82	High
Auditory	3.81	High
Visual	3.79	High
Reading/Writing	3.76	High
As a Whole SD = 0.43	3.79	High

Academic Performance of the Student-Respondents

Table 3 presents the academic performance of the respondents. The data show that student-respondents had “advanced” academic performance (60.78%); 32.68 percent, “proficient;” and 6.54 percent, “approaching proficiency.”

The mean of 90.03 (advanced) implies that the students’ academic performance is of above average level.

Table 3. Academic performance of the respondents taken as a whole

ACADEMIC PERFORMANCE	FREQUENCY	PERCENTAGE
Advanced	93	60.78
Proficient	50	32.68
Approaching Proficient	10	6.54
TOTAL MEAN = 90.03 (Advanced)	153	100.00

Academic Performance of the Student-Respondents as an Entire Group

Table 3a presents the academic performance of the respondents as an entire group. The data show that Agricultural and Biosystems Engineering students (M=92.44) and Education students (M=91.46) had “advanced” academic performance while Agriculture (M=88.32) and Business Administration students (M= 88.00) had “proficient” academic performance, respectively. The mean of 90.03 (advanced) implies that the students’ academic performance is of above average level.

Table 3a. Academic performance of the respondents as entire group

VARIABLES	MEAN (M)	SD	VERBAL INTERPRETATION
Business and Administration	88.00	3.40	Proficient
Agriculture	88.32	3.48	Proficient
Agricultural and Biosystems Engineering	92.44	3.34	Advanced
Education	91.64	2.55	Advanced
As a Whole	90.03	3.67	Advanced

Academic Performance of the Respondents when Classified according to Selected Variables

Sex. Majority of the female respondents (M=90.65) had “advanced” academic performance while male respondents (M=88.44) had “proficient” academic performance. This signifies that female respondents had better academic performance compared to their male counterpart.

Age. Respondents on the age bracket between 17 - 19 years (M=90.61) had “advanced” academic performance; those between 20 - 22 years (M=87.19) and 23 - 25 (M=85.00) had “proficient” academic performance, respectively.

Fathers’ Education. Respondents whose fathers were college level (M=91.33), college graduate (M=90.60), elementary graduate (M=90.18), high school graduate (M=90.10), had “advanced” academic performance while those respondents whose fathers were elementary level (M=89.67) and high school level (M=89.14) had “proficient” academic performance, respectively.

Mothers’ Education. Respondents whose mothers were college graduates (M=91.71), college level (M=91.10), elementary level (M=90.46), and elementary graduate (M=90.23), had “advanced” academic performance; while those whose mothers were high school graduate (M=89.00) and high school level (M=88.60) had “proficient” academic performance, respectively.

Family Structure. Respondents under solo parent (M=91.00) and nuclear (M=90.07) had “advanced” academic performance, while extended family structure (M=89.40) had “proficient” academic performance.

Place of Residence. Respondents who live in the Poblacion (M=90.37) had “advanced” and those who live in the barangay (M=89.99) had “proficient” academic performance.

Table 3b. Academic performance of the respondents when classified according to personal and family-related variables.

	MEAN (M)	SD	VERBAL INTERPRETATION
Sex			
Male	88.44	4.12	Proficient
Female	90.65	3.28	Advanced
TOTAL	90.03	3.67	Advanced
Age			
17 – 19 yrs	90.61	3.51	Advanced
20 – 22 yrs	87.19	3.07	Proficient
23 – 25 yrs	85.00	0.00	Proficient
TOTAL	90.03	3.67	Advanced
Fathers’ Education			
Elementary Level	89.67	3.23	proficient
Elementary Graduate	90.18	3.41	Advanced
High school Level	89.14	3.17	Proficient
High school Graduate	90.10	4.16	Advanced
College Level	91.33	3.81	Advanced
College Graduate	90.60	3.86	Advanced
TOTAL	90.03	3.67	Advanced
Mothers’ Education			
Elementary Level	90.46	3.46	Advanced
Elementary Graduate	90.23	3.39	Advanced
High School Level	88.60	3.57	Proficient
High School Graduate	89.00	3.80	Proficient
College Level	91.37	4.21	Advanced
College Graduate	91.71	3.81	Advanced
TOTAL	90.03	3.67	Advanced
Family Structure			
Nuclear	90.07	3.65	Advanced
Solo parent	91.00	4.14	Advanced
Extended	89.40	3.42	Proficient
TOTAL	90.03	3.67	Advanced
Place of Residence			
Poblacion	90.37	4.69	Advanced
Barangay	89.99	3.55	Proficient
TOTAL	90.03	3.67	Advanced

Differences in the Multiple Intelligences of the Respondents when Grouped According to Personal and Family-Related Variables

Multiple Intelligences and Sex. Results revealed that no significant difference was observed in the students’ multiple intelligences when they were classified according to sex (t-value=1.385, p>.05). Therefore, the null hypothesis stating no significant difference existing in the students’ multiple intelligences when classified according to sex is accepted. This implies that students’ multiple intelligences are similar regardless of their sex. The result of the study negates the findings of Loori (2005) and Razmjoo (2008) stating that there were significant differences between males’ and females’ multiple intelligences. It further disagrees to the findings of Tsai (2016) who found that boys and girls had significantly different multiple intelligences.

Multiple Intelligences and Age. The data reveal no significant difference in the multiple intelligences of the students when grouped ac-

ording to age as shown by the F-value of 2.182 which is not significant at 0.05. Thus, the null hypothesis stating no significant difference in the multiple intelligences of the students when grouped according to age is accepted. This result agrees with the findings of Gaundare and Yeole (2014) who found age creates no significant difference in multiple intelligences level of students. This is also in consonance with the research of Katzowitz (2002) who found out no significant difference in multiple intelligences based on age.

Multiple Intelligences and Fathers' Education. The results (F-value=1.66, P>0.05) in Table 4 show no significant difference in the students' multiple intelligences when they were classified according to educational attainment of their fathers. Thus, the null hypothesis stating no significant difference in the students' multiple intelligences when classified according to fathers' education is accepted. This finding disagrees with the findings of Gaundare and Yeole (2014) who found that students whose fathers are educated or graduated from college are found ahead in majority of the intelligences than those who are not.

Multiple Intelligences and Mothers' Education. The result of the Analysis of Variance in Table 4 indicates a significant difference in the students' multiple intelligences when they were classified according to education of mothers (F-value=1.789, P>0.05). Thus, the null hypothesis stating no significant difference in students' multiple intelligences when they are classified according to their mothers educational attainment is accepted. The result agrees with the findings of Aydemir (2014) who concluded that there is no significant difference in student's intelligence areas and mother's educational status.

Multiple Intelligences and Family Structure. Data in Table 4 shows no significant difference in the students' multiple intelligences when they were classified according to family structure (F value= 0.829, P>0.05). Therefore, the null hypothesis stating no significant difference in the students' multiple intelligences when they are classified according to family structure is accepted. It implies that the multiple intelligences of the students are the same regardless of their family structure. This finding relates to the findings of Afzal et al. (2016) who found out that family structure does not have significant effect on intelligences of students.

Multiple Intelligences and Place of Residence. The data in the same table reveal no significant difference in students' multiple intelligences when classified according to place of resi-

dence (t-value= 0.310, P>0.05). Therefore, the null hypothesis stating no significant difference in the students' multiple intelligences when classified according to place of residence is accepted. It implies that the multiple intelligences of the students are not influenced by their place of residence. This finding disagrees with Gaundare and Yeole (2014) who found out that students from rural barangays are found ahead compared to those residing in urban area students.

Table 4. Differences in the multiple intelligences of the respondents when grouped according to personal and family-related variables.

VARIABLES	STATISTICAL TOOLS	F	Sig.
Multiple Intelligences and Sex	T-test	t = 1.050 ^{ns}	0.295
Multiple Intelligences and Age	ANOVA	F = 2.182 ^{ns}	0.093
Multiple Intelligences and Fathers' Education	ANOVA	F = 1.166 ^{ns}	0.329
Multiple Intelligences and Mothers' Education	ANOVA	F = 1.789 ^{ns}	0.105
Multiple Intelligences and family Structure	ANOVA	F = 0.829 ^{ns}	0.439
Multiple Intelligences and Place of Residence	T-test	t = 0.31 ^{ns}	0.75

Differences in the Learning Styles of the Respondents when Grouped According to Personal and Family-Related Variables

Learning Styles and Sex

As shown in Table 5, the t-value=1.134 indicates that there was no significant difference in the learning styles of the respondents when they were grouped into sex. Thus, the null hypothesis stating no significant difference in the learning styles of the respondents when grouped according to sex is accepted. This result is consonance with the finding of Slater, J. et al. (2007) and Kibasan and Singson (2016) who found that types of modality combinations are not significantly different between genders.

Learning Styles and Age

The data in Table 5 reveal that there was no significant difference in the learning styles of students when they were grouped according to age (F= 1.103, P>0.05). Thus, the null hypothesis stating no significant difference in the learning styles of students when they are grouped according to age is accepted.

Learning Styles and Fathers' Education

Table 5 reveals a significant difference in the learning styles of the students when they were classified according to education of fathers ($F=1.743$, $P>0.05$). It can be said that education of father does not affect the students' learning styles preferences. Thus, the null hypothesis stating no significant difference in the learning styles of the students when they are classified according to education of fathers is accepted.

This finding disagrees with the result of the study of Kibasan and Singson (2016) who indicated that parents' profile has influence the learning styles of their child.

Learning Styles and Mothers' Education

In the same table, data reveal no significant difference in the learning styles of the students when they were classified according to education of mothers ($F=1.081$, $P>0.05$). Hence, the null hypothesis stating no significant difference in the learning styles of the students when they are classified according to education of mothers is accepted. This finding negates the study of Kibasan and Singson (2016) who found out that there are significant differences on the learning styles of Libyan students according to their mothers' education.

Learning Styles and Family Structure

Result of Analysis of Variance shows no significant difference in the learning styles when respondents were classified according to family structure ($F=1.090$, $P>0.05$). Therefore, the null hypothesis stating no significant difference in the learning styles when the respondents are classified according to family structure is accepted. This implies that the learning style preferences of the students are not influenced by their family structure.

Learning Styles and Place of Residence

Table 5 shows the difference in the learning styles of the respondents when they were classified according to place of residence. The t-value of 1.284 indicates no significant difference in the learning styles of the students when they were classified according to place of residence. Hence, the null hypothesis stating no significant difference in the learning styles of the students when they are classified according to place of residence is accepted. It implies that the learning styles of the students are the same regardless of the place of residence.

Table 5. Differences in the learning styles of the respondents when grouped according to personal and family-related variables

VARIABLES	STATISTICAL TOOLS	F	Sig.
Learning Styles and Sex	T-test	1.134 ^{ns}	0.259
Learning Styles and Age	ANOVA	1.103 ^{ns}	0.365
Learning Styles and Fathers' Education	ANOVA	1.743 ^{ns}	0.128
Learning Styles and Mothers' Education	ANOVA	1.081 ^{ns}	0.376
Learning Styles and family Structure	ANOVA	1.090 ^{ns}	0.339
Learning Styles and Place of Residence	T-test	0.54 ^{ns}	0.590

ns – not significant

Differences in the Academic Performance of the Respondents when Grouped according to Personal and Family-Related Variables

Academic Performance and Sex

The T-test result reveals a highly significant difference was observed in the students' academic performance when classified according to sex (t-value=-3.471, $P<0.01$). Hence, the null hypothesis stating no significant difference in the students' academic performance when classified according to sex is rejected. The result of the study disagrees with the findings of Oxiño (2014) who found out that there was no significant difference in the academic performance of students when they are classified according to sex.

Academic Performance and Age

The findings of the study showed that there was a highly significant difference in the academic performance of the students when grouped according to age (t-value=9.874, $P<0.01$). Therefore, the null hypothesis stating that there is no significant difference in the students' academic performance when classified according to age is rejected. This implies that the students' academic performance is influenced by their age. The age bracket between 17-19 years performs better than its age counterparts. Furthermore, this age group does not include the repeaters or dropouts; hence they perform well in the class.

Academic Performance and Fathers' Education

Table 8 shows that the academic performance of students did not significantly differ when they were grouped into educational attainment of their fathers ($F=0.581$, $P>0.05$). Thus, the null hypoth-

esis stating no significant difference in the academic performance of students when they are grouped into educational attainment of their fathers is accepted. This implies that the fathers of the respondents take part or assist their children in their studies. This finding is disagrees with Lagon (2012) who found out that there was a significant difference in the academic performance of the high school students when they were grouped according to their fathers' education.

Academic Performance and Mothers' Education

The findings revealed that there was no significant difference in the academic performance of the students when they were classified according to mothers' education ($F=1.048$, $P>0.05$). Therefore, the null hypothesis stating no significant difference in the academic performance of the respondents when they are classified according to education of mothers is accepted. The finding disagrees with the result of Lagon (2012) who mentioned that there was a significant difference in the academic performance of high school students when they were classified according to education of their mothers.

Academic Performance and Family Structure

As shown in Table 6, results reveal that there was no significant difference in the academic performance of the students when they were classified according to family structure ($F=0.344$, $P>0.05$). Hence, the null hypothesis stating no significant difference in the academic performance of the students when they are classified according to family structure is accepted. This finding negates Hussain (2012) who found out that family structure stimulates their children's intellectual facilities. It further contradicts with Nato (2016) who found that nuclear family background positively influenced the academic performance of the students.

Academic Performance and Place of Residence

As indicated in Table 6, there was no significant difference in the academic performance of the respondents living in the Poblacion and those living in the barangay (T value= -0.290 , $P>0.05$). Hence, the null hypothesis stating no significant difference in the academic performance of the respondents when they are classified according to place of residence is accepted. This study disagrees with the study of Lagon (2011) who revealed that there was a significant difference in the academic performance of the students when

they were classified according to their place of residence.

Table 6. Differences in the academic performance of the respondents when grouped according to personal and family-related variables

	STATISTICAL TOOLS	F	Sig.
Academic Performance and Sex	T-test	4.071**	0.000
Academic Performance and Age	ANOVA	9.874**	0.000
Academic Performance and Fathers' Education	ANOVA	0.581 ^{ns}	.0714
Academic performance and Mothers' Education	ANOVA	1.048 ^{ns}	0.397
Academic Performance and family Structure	ANOVA	0.344 ^{ns}	0.710
Academic Performance and Place of Residence	T-test	0.290 ^{ns}	0.772

significant at 1%

ns – not significant

Relationship between Multiple Intelligences and Learning Styles of the Respondents.

As shown in Table 7, the findings revealed that multiple intelligences were highly related to the students' learning styles ($r=0.663$, $P<0.01$). Thus, the null hypothesis stating no significant relationship between multiple intelligences and learning styles is rejected. It can be said that multiple intelligences are the person's ability or strength in any one of the intelligences and the learning style is the way students learn best. Therefore, multiple intelligences and learning styles are related in principle including differences in learning (Dunn and Dunn, 1992).

Table 7. Relationship between multiple intelligences and learning styles of the respondents

VARIABLE	r-value	R – prob
Multiple Intelligences and Learning Styles	0.663**	0.000

** – significant at 1%

Relationship between Academic Performance and Dimension of Multiple Intelligences of the Respondents

As shown in Table 8, the r-value of 0.272 indicates a highly significant relationship between academic performance and existentialist, visual-spatial, math/logical, music/rhythmic, and intrapersonal dimension of multiple intelligences. It can be said that the students learn best if they enjoy discussing questions about life, they feel connected to people, ideas and beliefs; and they learn new things easier when they see their real world

application, thus improving academic performance in school.

Furthermore, it implies that students can easily learn if teachers use patterns, employ sound in teaching, allow students to listen to music and putting things in rhythm, have a step by step direction, provide problem solving, use calculations and logic puzzles, allow students to do things by themselves, use gestures in teaching, and allow students to demonstrate what they learn.

As a whole, there was a highly significant relationship between academic performance and the different dimensions of multiple intelligences. Hence, the null hypothesis stating no significant relationship between academic performance and multiple intelligences is rejected.

It can be said that the academic performance of the students is influenced by their multiple intelligences.

Table 8. Relationship between academic performance and multiple intelligences of the student-respondents.

MULTIPLE INTELLIGENCES	r-VALUE	SIG.(2-TAILED)
Visual-Spatial	0.289**	0.000
Verbal-Linguistic	0.116 ^{ns}	0.153
Math/Logical	0.285**	0.000
Bodily-Kinesthetic	0.067 ^{ns}	0.413
Musical/Rhythmic	0.263**	0.001
Intrapersonal	0.239**	0.003
Interpersonal	0.114 ^{ns}	0.162
Naturalist	0.143 ^{ns}	0.078
Existentialist	0.309**	0.000
As a Whole	0.272**	0.001

** - significant at 1%

ns – not significant

Relationship between Academic Performance and Learning Styles of the Respondents.

Table 9 reveals the relationship between students' academic performance and different modalities of learning styles. The findings show a highly significant relationship between visual learning styles and academic performance (r-value=0.266, P<0.01).

Data reveal there was a highly significant relationship between auditory learning style and academic performance (r-value=0.220, P<0.01). It could be inferred that the more teachers use a hands-on approach method, the higher is the learning, thus, higher academic performance on the part of the students.

As a whole, there was a significant relationship between learning styles and academic performance of the first year college students (r-value=0.170, P<0.05). Hence, the null hypothesis stating no significant relationship between academic performance and learning styles is rejected.

The result of the study strengthens the study of Dunn and Dunn (1992) who found that learning style based instruction has shown to have a significant influence on increasing academic achievement and improving attitude toward school.

Table 9. Relationship between academic performance and learning styles of the respondents

LEARNING STYLES	r-value	R -prob
Visual	0.266**	0.001
Auditory	0.220**	0.006
Reading/Writing	0.008 ^{ns}	0.919
Kinesthetic/Tactile	0.068 ^{ns}	0.404
As a Whole	0.170*	0.035

ns – not significant

* -significant at 0.05 level

** - significant at 0.01 level

CONCLUSIONS

From the foregoing findings, the following conclusions were drawn:

1. The first year college students in the four departments of Capiz State University Burias Campus had “high” multiple intelligences implying that they practiced and employed in their studies the combinations of the different dimensions of multiple intelligences.
2. Further, it was revealed that first year college students had “high” learning styles preferences implying that they employed the four modalities of learning styles in their learning.
3. The students had “advanced” academic performance implying that the teachers may have given the learning atmosphere patterned to the students' preferred multiple intelligences and learning styles.
4. Moreover, age and sex influenced students' academic performance. This implies that as the students grow older, the more they are able to enhance their multiple intelligences and develop their learning styles, thus improving academic performance.
5. Furthermore, multiple intelligences was related to learning style of the students.
6. This research study found out that academic performance of the students was influenced by the different dimensions of multiple intelligences such as existentialist, visual-spatial/math/logical, music/rhythmic, and intrapersonal.
7. Finally revealed that academic performance of students was influenced by their learning style such as visual and auditory.

RECOMMENDATIONS

Based on the aforementioned conclusions, the following recommendations are proposed by the researcher:

1. The curriculum planner must be consider to the students' different dimensions of multiple intelligences in planning the curriculum.
2. The administrators, specialists, and teachers must pattern the different strategies and techniques in teaching to the level of the learners.
3. Teachers must provide varied assessments to reinforce advanced performance of students.
4. Performance of students must improve if they are in their ideal age of being a first year college students. Teachers must consider the sex preference of the students in conducting assessments.
5. Integration of different dimensions of multiple intelligences and varied modalities of learning style to enhance performance of students.
6. Facilitators must incorporate different multiple intelligences into the daily plans to improve students' performance.
7. Incorporating learning styles into daily lesson plans to improve students' self-esteem, retention rates, motivation towards learning and incidence of off-task behaviors.

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MULTITASKING: IMPACT ON ELEMENTARY INSTRUCTION

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ABSTRACT

Multiple assignments in schools were observed to be a great challenge to teachers. This led the researcher to conduct this descriptive study to determine the impact of multitasking to elementary instruction. Using a researcher-made questionnaire containing indicators on teaching effectiveness, student learning and classroom environment, mean results generally revealed the impact of multitasking to instruction. According to 60 elementary teachers, it shortens their time for instructional materials preparation; affects their class schedules; and, increases their tensions. Male and female teachers either handling primary or intermediate classes and who have taught for short or long years claimed that multitasking affected their teaching jobs and performances. The impact of multitasking among teachers did not significantly differ as to sex, grade level taught and years of teaching experience. Qualitative results generated common themes like overloaded assignments, pressures of reports; effect to teaching effectiveness and productivity; health, family and emotional issues; and, unfairness to learners. Multitasking is not favourable to teachers. Teaching may be effective when teachers focus solely on instruction.

Keywords: Social Science, Impact, Multitasking, Elementary, Instruction, Dumangas, Iloilo

INTRODUCTION

Quality in education is the goal of every learning institution. The 1987 Constitution Article XIV, Section 1 provides that the State shall protect and promote the right of all citizens to quality education at all levels, and shall take appropriate steps to make such education accessible to all. Hence, it is of paramount importance that quality teachers and instruction are provided to learners. NORAD, (2015) argued that teacher is the most important factor in the quality of education. Thus, the school management should give focus to teachers being the transformative tool in changing lives. Teachers should be equipped with appropriate and adequate instructional materials to make them realize their mandates.

As the government demands for quality instruction, the work pressures are increasingly laid upon the teachers who struggle to accomplish deadlines for reports at the same time ordeals with their teaching functions. In most cases, during the implementation of school programs and due to the limited number of teachers in schools, they act as immediate staff who would perform

other school related functions as coordinators of other programs. To this effect, teachers tend to sacrifice their teaching functions and learners were deprived of instruction. Due to varying demands of teachers' services in schools, multitasking on their part has been a great challenge. This notion of the researcher was confirmed by the expression of Catapano (2018) in his study that with so many responsibilities and so much technology, doing just one thing at a time seems awfully wasteful. These behaviors may cause teachers to do a disservice to their colleagues, students, and even to themselves. This study result was equated in Juran's 80/20 Rule, termed as the "vital few and the trivial many" which states that 20 percent of work requires 80 percent of time (Fich, 2012). When applied to work load and time management, this means that workers must list and prioritize their work, then focus their time and efforts on the vital 20 percent of their work for good results. Therefore, teachers need to prioritize teaching so that they could generate quality learning outcomes rather than performing multifunction that produces little result.

The scenario at hand needs to be given due

attention by the higher authorities because teachers were not hired to do office works but to teach. The success of learners greatly lies in their hands; therefore, it is imperative that they be freed from extensive and multiple assignments so they can perform their duties of an effective teacher and produce quality graduates.

In view of these observations, the researcher got interested in determining the impact of multitasking on classroom instruction as experienced by the public school teachers in the District of Dumangas, Iloilo, Philippines.

REVIEW OF RELATED LITERATURE AND STUDIES

Multitasking is defined in so many different ways by the different authors: It is a person's ability to do more than one thing at a time (Cambridge English Dictionary, 2019). In a human context, multitasking is the practice of doing multiple things simultaneously (Rouse, 2013). It entails juggling different work activities and shifting attention from one task to another (Doyle, 2018).

According to Christensen (2015), the average teacher makes 1,500 educational decisions per school day. That's four decisions a minute! No wonder teachers work harder than just about any other professionals. Teachers therefore are the ultimate multitaskers. They're not only responsible for student learning; they also act as a surrogate parent, discipliner, assessment expert, mentor, and administrator. But all that multitasking comes at a price. Psychologists and neuroscientists explain that the brain changes focus in two ways: goal shifting and rule activation. Essentially, the brain stops one task and starts another while turning off the old-task rules and focusing on new-task rules. But when people tell their brain to perform two tasks at the same time, the whole process slows down. By doing this, multitaskers can lose up to 40 percent in productivity during their most productive period of the day.

Capatano (2018) further explains that its relatively common knowledge that multitasking when it comes to classroom management doesn't work the way one would like it to. And even though they would like to try and push themselves to doing two or more things at once, it just doesn't benefit them to do so. Multitasking decreases productivity by 40% and it can even lower IQ by 10 points. Multi-tasking means overloading the brain with stimuli and commands creates stress,

and may even lead to health consequences.

What causes some to indulge in multitasking? Cerulo (2017) presented some of the results that emerged from a recent ethnographic research where different roles that the schools managers were highlighted. The result showed that because of the absence of adequate staff to support daily activities, head teachers were forced to perform different roles and interact on different social stages, although often lacking the skills to do so.

For those who lack extensive knowledge of the effect of multitasking, the researcher offered some scenarios based on foreign studies: Mohammed Alkahtani, Ali Ahmad, Saber Darmoul, Shatha Samman, Ayoub Al-zabidi, Khaled Ba Matraf (2016) reviewed the impacts of multitasking on Education. Analyzes of these studies offered an understanding of the relationship between multitasking and academic performance among students. The data show that multitasking during class has a negative influence on college GPA. Students took significantly longer to interact in reading which extends the length of executing an academic task. Likewise, there is a negative effect to the faculty members while multitasking on the academic work.

Matthew, L. (2015) studied the effect of multitasking and grade performance of undergraduate nursing students. He concluded that multitasking during class affects outcomes in terms of grading.

Burak, L. (2012) investigated the prevalence of "Multitasking in the University Classroom." Although research evidence indicates that multitasking results in poorer learning and poorer performance, many students engage with text messaging, Facebook, internet searching, emailing, and instant messaging, while sitting in university classrooms. Research suggests that multitasking may be related to risk behaviors. Results further showed that students who engage in multitasking in the classroom significantly relates to lower GPA and an increase in risk behaviors.

Hassoun's (2014) case study of classroom multitasking and attentional performance showed that students increasingly split their attentions between lecture and personal media, while educators largely view the new screens as fostering disengaged and distracted forms of conduct.

Benbunan-Fich (2012) studied the developing a theory of multitasking behavior. He explained that the increasing use of Information Technology devices coupled with the time pressures that characterize modern life have transformed multitasking from an occasional behavior into a habit. To this end, he developed a theory of multitasking

behavior and identifies the causes, consequences, and patterns that characterize it. The core of the theory is the articulation of a typology of technology enactment shifts where ongoing tasks are fragmented and integrated with others due to internal or external triggers. The theory puts forth a set of propositions to explicate the causal logic for multitasking patterns and the likely performance consequences associated with them. This new theoretical view of multitasking has the potential to affect the design of systems and interfaces, to inform user behavior research, and to enrich human computer interaction studies.

Rouse (2013) enumerated few research findings about multitasking: (1) For students, an increase in multitasking predicted poorer academic results; (2) Multi-taskers took longer to complete tasks and produced more errors; (3) People had more difficulty retaining new information while multitasking; (4) When tasks involved making selections or producing actions, even very simple tasks performed concurrently were impaired; (5) Multi-taskers lost a significant amount of time switching back and forth between tasks, reducing their productivity up to 40%; (6) Habitual multi-taskers were less effective than non-Multi-taskers even when doing one task at any given time because their ability to focus was impaired. (7) Multitasking temporarily causes an IQ drop of 10 points, the equivalent of going without sleep for a full night. (8) Multi-taskers typically think they are more effective than is actually the case.

STATEMENT OF THE PROBLEM

This descriptive study aimed to determine the impact of multitasking on classroom instruction as experienced by the teachers in selected public elementary schools in the Municipality of Dumangas, Iloilo, Philippines.

Specifically, it attempted to answer these questions:

1. What are the impacts of multitasking on classroom instruction according to teachers when taken as an entire group and when they are grouped as to sex, grade level taught and years of teaching experience?
2. Are there significant differences in the impacts of multitasking on classroom instruction according to teachers when they are grouped as to sex, grade level taught and years of teaching experience?

HYPOTHESIS OF THE STUDY

There are no significant differences in the impacts of multitasking on classroom instruction according to teachers when they are taken as an entire group and when they are grouped as to sex, grade level taught and years of teaching experience.

Conceptual Framework

This study gives a picture of the relationships of the independent variables: sex, grade level taught and years of teaching experience and the dependent variable: effect of multitasking in the classroom among public elementary school teachers in Dumangas, Iloilo.

Paradigm

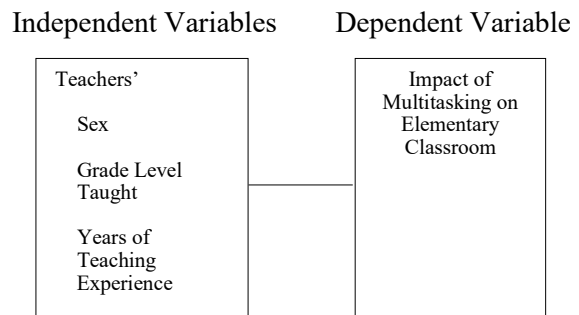


Fig.1 Conceptual Framework of the Study

METHODOLOGY

1. What is the level of acceptability of bangus meatloaf using the same measures of ingredients mixed with: ½ cup bangus meat with ½ cup ground pork, ¾ cup bangus meat with ¼ cup ground pork, and 1 cup pure bangus meat

Research Design

Are there significant differences in the level of acceptability of bangus meatloaf in different proportions when evaluated as to specific characteristics: color, aroma, texture and taste?

This study employed the mixed method of research. In quantitative method, the numbers derived from the survey gave insights on the impact of multitasking on classroom instruction as experienced by the teachers as a whole and in terms of their sex, grade level taught and years of teaching experience especially in areas of teaching effectiveness, student learning and classroom management. Qualitative data helped explain the

personal experiences of the teachers in the practice of multitasking.

Locale of the Study

This study was conducted at selected public elementary schools in the Municipality of Dumangas, Iloilo, Philippines which included the central and barangay schools both in District I and II.

Respondents of the Study

Public elementary school teachers in the District I and II of the Municipality of Dumangas, Iloilo, Philippines were selected for the study. They were grouped according to sex, grade level handled and years of teaching experience. Using the frequency count and percentages, the results revealed that a total of 60 or 100% teachers were involved in the study. Three or 5% are male and 57 or 95% are female. Teachers handling the primary grades were 32 or 53.3% while 28 or 46.7% were handling the intermediate grades. As to years in teaching experience, 18 or 30% of teachers served for 1-5 years, 10 or 33.33% for 6-10 years, and 32 or 53.33 served for 11 years and more.

Sampling Technique

This study employed the purposive sampling technique in choosing the respondents. Thirty elementary teachers were chosen in every school district. Every district was composed of several barangay elementary schools where these teacher-representatives were taken.

Research Instrument

The researcher -made survey questionnaire was composed of two parts. The first part of the instrument included the profile of the teachers as to sex, grade level handled and years of teaching experience while the second part consisted of 45 statements covering the areas in effectiveness of teaching, student learning, and classroom management to determine the impact of multitasking on classroom instruction. The teachers were made to choose from the scale of 1-5 whether or not they agree or disagree with the statements. The instrument also included open-ended questions to generate qualitative data based on the teachers' experiences in doing multitasking in the classroom. It was validated by the research experts and panel members for their comments and suggestions. Editions were made to indicators with comments and suggestions. The edited instrument was reproduced and subjected for pilot test-

ing to a group of elementary teachers in different public elementary schools other than the identified respondents. The retrieved data were subjected to a reliability test and it yielded a Cronbach alpha result of .987. Good items were included in the final draft of the instrument while poor items were improved. Final edition and reproduction was done for the final administration to the actual respondents.

Data Gathering Procedure

Before the survey was administered, the researcher first sought the permission from the two District Supervisors in the Municipality of Dumangas, Iloilo and the School Principals. After the grant of approval, with the assistance of the Principal, the researcher personally administered the instrument to the thirty elementary teachers per District. After the retrieval of the instrument, the teachers' responses were tallied, coded and encoded to Microsoft Excel for statistical treatment using the SPSS.

Data Analysis

For the analysis of data, the researcher submitted the encoded raw data for statistical treatment with the aid of the SPSS software. The tools: frequency count, percentage, mean and rank for the descriptive analyses while Mann Whitney and Kruskal-Wallis H test were employed for the inferential analysis. For the qualitative data, the teachers' statements in answer to open-ended questions were based on their personal experiences in doing multitasking in the classroom categorized according to themes.

FINDINGS

The researcher presents the top three indicators showing the impact of multitasking on instruction according to the teachers and its difference when they were grouped as to variables. It likewise shares the results of the thematic analysis that would describe the multitasking experiences of the elementary teachers with its implications for educational planning and development.

Descriptive Analysis

As an entire group, the top three impacts of multitasking on classroom instruction according to the teachers in areas of teaching effectiveness are: it shortens the preparation time of the lesson materials; it affected teachers' actual teaching jobs; and multitasking is stressful on their part as

classroom teachers. In terms of student learning, the teachers denoted that multitasking activities affect the schedules of classes; constant meetings disrupt scheduled classes; and, multitasking does not allow mastery of skills even when teachers struggle to develop in students' specific competencies. Related to teachers' classroom management, they said that multitasking increases teachers' tensions thus affect the classroom environment; time management of teachers are affected by the instant submission of reports; however, teachers who do multitasking enables them to design and implement learning conditions and experiences that promote healthy exchange and/or confrontations.

The result of the study implies that multitasking for the teachers is not favorable. This result is consistent to the research findings of Catapano (2019) who said that since there's less cognitive power devoted to individual tasks, the actual intelligence quotient diminishes while multitasking. Multitaskers took longer to complete tasks and produced more errors. They lost a significant amount of time switching back and forth between tasks, reducing their productivity up to 40% (Rouse, 2013).

Impact of Multitasking on Elementary Instruction as an Entire Group

	Impact of Multitasking	Mean	Rank
	Effectiveness of Teaching.		
	<i>Multitasking in the classroom...</i>		
1.	affects my actual teaching job.	4.55	2.5
2.	shortens the preparation time of my lesson materials.	4.62	1
12.	is stressful to teachers.	4.55	2.5
	<i>Student Learning</i>		
17.	like constant meetings disrupt actual scheduled classes.	4.12	2
18.	like evaluations affect the schedules of my classes.	4.30	1
27.	does not allow mastery of skills even when teachers struggle to develop in students the competencies.	4.13	3
	<i>Classroom Management</i>		
35.	time management of teachers are affected by the instant submission of reports.	4.07	2
36.	increases teachers' tensions thus affect the classroom environment.	4.12	1
42.	enables teachers to design and implement learning conditions and experiences that promote healthy exchange of ideas and/or confrontations.	3.83	3

As to sex, the male and female respondents revealed that multitasking influences teaching performance; it affects their actual teaching jobs; it shortens their time in lesson preparation; attendance in meetings affects teaching preparation; it affects teachers' concentration; and, it is stressful

to teaching; In terms of student learning, the male teachers said that evaluations affect the schedules of my classes; examination schedules are affected by evaluations; making of reports affect teaching; and multitasking does not allow mastery of skills even when teachers struggle to develop in students the competencies. On the other hand, the female teachers said the evaluations affect the schedules of classes; examination schedules are affected by evaluations; and, multitasking does not allow mastery of skills.

As to classroom management, the male teachers revealed that they can hardly prepare effective instructional materials to reinforce learning processes even when he had lots of assignment but enables them to design and implement learning conditions and experiences that promote healthy exchange and/or confrontations; the time management of teachers are affected by the instant submission of reports; and teachers assume multiple roles as facilitator, resource person, coach, inquisitor, integrator, referee in drawing students to contribute to knowledge and understanding of the concepts at hand. On the contrary, the female teachers revealed that multitasking increases teachers' tensions thus affect the classroom environment; time management of teachers are affected by the instant submission of reports; and, multitasking annoys teachers as it affects their teaching jobs. It implies that both groups of teachers had generally negative perceptions on multitasking in the classroom either in terms of teaching effectiveness, student learning and classroom management. This result was supported by Christensen (2015) when she said that when people tell their brain to perform two tasks simultaneously, the whole process slows down. He added, even a few seconds of delay added up to lower over-all productivity; hence, multitaskers can lose up to 40 percent in productivity during their most productive period of the day.

When the teachers were grouped as to the grade level handled, in areas of effectiveness of teaching, both the teachers handling the primary and intermediate classes manifested the same impacts of multitasking in the classroom which states that it affects their actual teaching jobs; shortens the lessons preparation time; and is stressful to teachers. In terms of student learning, multitasking due to preparation on school evaluations affects the schedules of classes; constant meetings disrupt actual scheduled classes; examination schedules are affected by evaluations; multitasking do not allow mastery of skills even when teachers struggle to develop in students the com-

petencies. Multitasking increases teachers' tensions thus affect the classroom environment; it annoys teachers as it affect their teaching jobs; however, teachers who do multitasking enables them to design and implement learning conditions and experiences that promote healthy exchange and/or confrontations. Both groups of teachers manifested similar experiences on the impact of multitasking in the classroom which denoted a negative impression as an additional burden or stressors to their teaching job. Capatano (2018) further agreed that multitasking behavior of teachers may cause them to do a disservice to colleagues, students and themselves. Moreover, Rouse's (2013) findings revealed that habitual multitaskers were less effective than non-multitaskers because their ability to focus was impaired.

Teachers whose experiences were between 1-5, 6-10, and 11 years and more revealed that in the parameter, effectiveness of teaching, they considered multitasking as stressful; it shortens their lesson preparation time; thus, affected their actual teaching job and concentration and does not allow learners' mastery of skills.

On area of student learning, teachers revealed that constant meetings and evaluations disrupt actual schedule of classes, examination schedules are affected by evaluations and multitasking increases teachers' tensions thus affect the classroom environment and it does not allow mastery of skills. However, some teachers were able to effectively prepare multiple drills for the learners.

Considering classroom management, the time management of teachers was affected by the instant submission of reports; multitasking increases teachers' tensions and annoys teachers thus affect the classroom environment. The positive side of multitasking is that teachers can assume multiple roles as facilitator, resource person, coach, inquisitor, integrator, referee in drawing students to contribute to knowledge and, understanding of the concepts at hands. Further, some teachers who did multitasking enabled them to design and implement learning conditions and experiences that would promote healthy exchange and/or confrontations; and, assumes the roles as facilitator, resource person, coach, inquisitor, integrator, referee in drawing students to contribute to knowledge and understanding of the concepts at hand. It is concluded that the three groups of teachers regardless of years of teaching experience exhibited more or less similar impressions as to the effects of multitasking in the classroom which is somewhat not favorable to them as it

disrupts their actual job and performance. Alquizar's (2018) study confirms this finding that multitasking of teachers in the workplace affected all facets of the teachers' lives, their time management and their prioritizing tasks. She revealed that multitasking of teachers in the workplace is prevalent and thus through experiences emerged themes such as self-sacrifice, personal and career challenge and personal growth and development.

Inferential Analysis

Mann Whitney U test revealed that no significant difference existed in the impact of multitasking on elementary instruction according to teachers when they were grouped as to sex. The results imply that the teachers showed the same experiences in the practice of multitasking in the classroom when they were grouped as to sex. The result was strengthened by Matthew (2015) who said that multitasking during class affects outcomes.

Moreover, no significant difference existed in the impact of multitasking on elementary instruction according to teachers as to grade level handled. The results imply that the impact of multitasking to classroom instruction did not differ when the teachers were grouped as to grade level handled. Whether or not a teacher is teaching in the primary or intermediate grades, their experiences were more or less similar. Alkahtani, Ahmad, Darmoul, Samman, Al-zabidi, Matraf's (2016) study is in agreement with the current findings when they found out that multitasking has had a detrimental effect on schoolwork either in high school or in college.

Mann Whitney Results in the Impact of Multitasking in the Elementary Instruction when Teachers were Grouped as to Sex and Grade Level Handled

Compared Means	Mean Rank	U	Sig.
Sex			
Male	38.33	62.500	.425
Female	30.09		
Grade Level Handled			
Primary Level	30.72	441.000	.917
Intermediate	30.25		

p>.05 alpha level

Kruskall-Wallis H test results revealed that no significant difference in the impact of multitasking to teachers existed when they were grouped as to years of teaching experience ($\chi^2 = 2.685$, $df = 2$, $P = .261$). The computed probabilities were more

than .05 alpha level. Result implies that the impact of multitasking on elementary instruction is the same as to the teachers' years of teaching experience. This notion was supported by D'Angelo's (2020) claim that balancing more than one task at a time actually hinders employee performance.

Difference in the Impact of Multitasking on Elementary Instruction when Teachers were grouped as to Year of Teaching Experience

Sources of Variation	df	Mean Rank	X ²	Sign.
Years of Teaching Experience				
1-5 years	2	25.28	2.685	.261
6-10 years		29.75		
11 years or more		33.67		

p>.05 alpha level

In order to actually get the insights of the teachers as to their roles and other school-related responsibilities, the researcher integrated some open-ended questions in the instrument to triangulate the teachers' experiences with multitasking in the classroom. Using thematic analysis, themes like overloaded assignment and pressures of reports; productivity and teaching effectiveness; health, family and emotional issues; and, unfairness of multitasking practices to learners surfaced from the narratives. From the results, the teachers briefly detailed the negative implications & effects of multitasking in classroom instruction.

The results derived from the narrative responses of teachers using the thematic analysis were triangulated with the quantitative data and it generated similar reactions and expressions from the participants of the study. It therefore implies that multitasking on the part of the teachers is not favourable as it affects their teaching effectiveness and student learning outcomes.

CONCLUSIONS

The findings of the study made the researcher to conclude that:

Multi-tasking for the teachers is not favourable.

Both groups of respondents as to sexes had negative perceptions on the practices of multitasking in the classroom especially in terms of teaching effectiveness, student learning and classroom management.

Both groups of teachers teaching in the primary or intermediate level manifested similar experiences on the impact of multitasking in the

classroom which express a negative impression as an additional burden or stressors to their teaching job.

All teachers regardless of years of teaching experience exhibited more or less similar impressions as to the impact of multitasking in the classroom which is somewhat disapproving to them as it disrupts their usual job functions and performance.

The multitasking experiences of teachers as cited in the direct responses suggest the kind attention and intervention by the Department of Education.

RECOMMENDATIONS

Based on the foregoing conclusions, the researcher has come up with these recommendations:

Teachers may be deloaded with extra assignment other than teaching.

The school head may elevate the problem of multitasking among teachers to the higher authorities for proper intervention.

The DepEd may consider increasing their work force as the demands for work, reports, programs also increases. Recruitment of office staff may be done to relieve teachers of other assignments.

The school head may try to empower other individuals/teachers through equal distribution of labor/load so that work would not be so heavy and difficult for everyone.

Utilizing the GAD budget, teachers may be provided with health benefits and wellness program to lessen the effects of stress to them.

The learners may be given preferential attention by deloading teachers of their assignments for them to effectively prepare varied and appropriate teaching materials, perform their teaching functions effectively and to provide quality elementary instruction.

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PERCEPTION OF TEACHERS ON THE DEGREE OF IMPLEMENTATION IN TEACHING SCIENCE THROUGH A SPIRAL PROGRESSION APPROACH

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ABSTRACT

The study explored the perceptions of the teachers as to the extent of implementation of spiral progression approach in teaching Science in Surigao Norte National High School. A researcher-made questionnaire consisting of two parts was used to gather data. The questionnaire underwent a series of content validation and was pilot tested to get the reliability. The participants of the study were the secondary Science teachers of Surigao Norte National High School. Stratified proportionate sampling method was used to get the sample size of the participants. The researcher used the descriptive correlational design which ascertained the relationship between the profile of the participants and their perceptions towards the implementation of spiral progression approach. The study signified that the spiral progression approach was fully implemented in the school and was found to be beneficial to both teachers and students as it ensures mastery of the subject matter through gradual scaffolding of complexities in Science. The profile of the participants except relevant trainings attended do not influence the manner of how teachers perceived the implementation of spiral progression in teaching Science. Teachers acknowledged the very importance of spiral progression to students and consistently applied its concepts in teaching Science.

Keywords: Degree of implementation, Science, Spiral progression, Teaching strategies, and Vertical articulation.

INTRODUCTION

The goal of a meaningful education is to produce Filipino students who are lifelong learners who are both globally competitive and locally rooted. This is the Department of Education's main argument for why the Philippine educational system has undergone a paradigm shift. The major reform affects every aspect of education, with the goal of giving Filipino students a competitive advantage in the global marketplace. One of the highlights in the K to 12 Enhanced Basic Education Act of 2011 is the emphasis that the curriculum must be in spiral progression. Yumusak, Güngör Kesinkiliç(2016) coined the term spiral curriculum and suggested that such a curriculum would be structured around the great issues, principles and values that a society deems worthy of the continual concern of its members. He further emphasized that human cognition evolved in a step-by-step process of learning which implies that each learner holds the basic ideas of things and eventually acquire new knowledge from envi-

ronment interaction and daily experiences in life.

Among the different subjects, Science is one of the subjects that underwent major revisions (Montebon, 2014).In the old curriculum, Science subjects were offered one in each year level and were taught using discipline-based approaches. In the new curriculum, however, Science concepts and applications in all subjects are introduced in a spiral progression approach (SEAMEO INNOTECH, 2012).Spiral curriculum is a design framework which helps science teachers construct lessons, activities or projects that target the development of thinking skills and dispositions which do not stop at identification. It involves progression and continuity in learning science (Martin, 2008). He further asserted that progression describes pupils' personal journeys through education and ways, in which they acquire, apply and develop their skills, knowledge and understanding in increasingly challenging situations. Continuity on the other hand is concerned with ways in which the education system structures experience and provides sufficient challenge and progress for

learners in a recognizable curricular landscape. Therefore, spiral progression approach is an approach or a way on how to implement the spiral curriculum.

Science education aims to develop scientific literacy among students that would prepare them to be informed and participative citizens who are able to make judgments that might have social, health, or environmental impact. Scientific literacy refers to an individual's scientific knowledge and use of that knowledge to identify questions, acquire new knowledge, explain scientific phenomena and draw evidence-based conclusions about science related issues understanding of the characteristic features of science as a form of human knowledge and inquiry (PISA, 2009). Spiral progression in science is an effective approach to imbibe scientific competencies to learners as Mantiza (2013) emphasized that through spiral progression, the students spiral upwards as the new knowledge is introduced in the next lesson, enabling them to reinforce what is already learned.

There are many conducted studies exploring the spiral progression approach like that of the study conducted by Orbe, et. al entitled "Teaching Chemistry in a Spiral Progression Approach: Lessons from Science Teachers in the Philippines" published in Australian Journal of Teacher Education, 2018 but there are no current studies conducted delving on how science teachers see and experience teaching science as a whole under the spiral progression approach of the K to 12 curriculum. The precedent research gap has prompted the researcher to explore the perceptions of the Science secondary teachers on the implementation of spiral curriculum in teaching science to secondary students with intent to address the needs and gaps through an analyzing the impacts and implications of the findings of the study.

As a result, according to the teachers of Surigao Norte National High School, the spiral development method to Science has been properly adopted.

STATEMENT OF PROBLEM

This study assessed the teachers' perceptions of the extent of implementation of spiral progression approach in teaching Science in Surigao Norte National High School. Specifically, it sought to answer the following questions

1. What is the profile of the Science teachers in terms of:
 - 1.1 age;
 - 1.2 gender;
 - 1.3 highest educational qualification;
 - 1.4 relevant trainings attended;
 - 1.5 length of service; and
 - 1.6 field of specialization?
2. To what extent is the Spiral Progression Approach in teaching science implemented with reference to:
 - 2.1 vertical articulation;
 - 2.2 mastery of the subject matter;
 - 2.3 teaching strategies;
 - 2.4 availability of instructional materials; and
 - 2.5 laboratory equipment?
3. Is there a significant relationship between profile of the Science teachers and their perceptions on the extent of implementation of spiral progression approach in teaching science?
4. What intervention plan can be proposed based from the findings of the study?

MATERIALS AND METHODS

The study employed descriptive-correlational research design in order to attain its objectives. The research design was deemed appropriate as it ascertained the relationship between the profile of the participants and their perception towards the implementation of spiral progression approach as Bold (2001) noted that the purpose of a correlational study is to establish whether two or more variables are related. Descriptive method proceeds to describe certain phenomena. For this reason, some authorities in research describe it to be "fact finding" or "information gathering" with analytical interpretations.

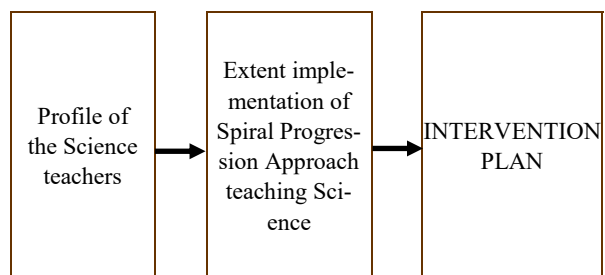


Figure 1. Flow of the study

Research Instrument

The researcher used a researcher-made questionnaire. The questionnaire underwent content validation from Science experts. The comments and suggestions given by the experts were incorporated in the revision of the instrument. Reliability test was done to ascertain the reliability of the questionnaire. It was first given to Science teachers who were not participants of the study. The computed Cronbach alpha was 0.77 which means that the researcher-made questionnaire passed the reliability test and ready for distribution to the participants of the study. The questionnaire was composed of two parts. The first part solicited the profile of the participants and the second part is the questionnaire delving on the perceptions of the Science teachers in spiral progression approach as to vertical articulation, mastery of subject matter, teaching strategies and availability of instructional materials and laboratory equipment.

Ethical Consideration

All information gathered from the respondents was treated with utmost confidentiality and respect. No data or information was unnecessarily divulged without the explicit permission of the Schools Division Superintendent in Surigao del Norte Division. The participants were given a consent document that stated the utmost confidentiality and secrecy of the responses.

Data Gathering Procedure

The researcher secured a permit from the Schools Division Superintendent in Surigao del Norte Division for the conduct of study in the public Junior High schools. Upon approval, the researcher administered the questionnaires personally to the select Science teachers. Retrieval of the instruments was done the following day. Analysis on the quantitative data was treated and inferred. Conclusions and recommendations were formulated based on the findings of the quantitative analysis.

RESULTS AND DISCUSSION

The presentation follows the sequence of specific problems posed in the study.

1. What is the profile of the Science teachers in terms of age, gender, highest educational qualification, relevant trainings attended, length of service, and field of specialization?

Table 1. Profile of the Science teachers' in terms of Age

Age	f	%
54-64	1	5.00
43-53	8	47.00
32-42	2	11.00
21-31	6	35.00
Total	17	100.00

Table 1 shows the profile of the Science teachers' in terms of age. Besides professional and academic knowledge, it is common belief that age may affect the manner of how one perceives something. To know how age played a significant part in this study, age of the teachers was tabulated.

Table 2. Profile of the Science teachers' in terms of Gender

Gender	f	Percentage
Male	0	0
Female	17	100
Total	17	100.00

Based on Table 2 in terms of gender, the participants of the study were all female Science teachers.

Table 3. Profile of the Science teachers in terms of Highest Educational Qualification

Highest Educational Qualification	f	%
Full-fledged PhD	0	0.00
PhD Units	0	0.00
Full-fledged MA	2	11.00
MS/MA Units	14	82.00
BS/BA	1	5.00
Total	17	100.00

In the highest educational qualification of the teachers as seen in Table 4, it can be noted that majority (14 or 82%) of the teachers had earned MS/MA units, 2 or 11% teachers were full-fledged MA and only 1 or 5% teacher earned the baccalaureate degree. There was no doctorate degree holder in the study. Katozai (2005) argued that knowledge is a chief weapon in the hands of teachers and therefore they should be a qualified one.

Table 4. Profile of the science teachers in terms of Relevant trainings attended

Relevant Trainings Attended	f	%
Very Sufficient	3	17.00
Sufficient	6	35.00
Insufficient	7	41.00
Very Insufficient	1	5.00
Total	17	100.00

It can be gleaned on Table 4 that 7 (41%) teachers attended one or two trainings in the division and district level only. There were 6 or 35% teachers with sufficient relevant trainings attended, 3 (17%) teachers had very sufficient relevant trainings attended and only 1 (5%) teacher had a very insufficient relevant training attended. Professional development of the teachers posited a greater impact on their performance as well as the way they view things. As a result, the teachers' Highest educational qualifications were gathered and presented. Relevant trainings attended by teachers is presented in Table 4.

Table 5 presents the profile of Science teachers in terms of number of years in teaching. Teacher experience, one of the main attributes of teacher quality, has gained attention and has been the focus of many investigations.(Goldhaber et.al, 2004; Wenglinisky, 2002). In this study, tenure of teaching is gathered to test whether it indeed has an effect to how teachers perceived the extent of implementation of the spiral progression in Science.

Table 5. Profile of the Science teachers in terms of the number of years in teaching

Years in teaching	f	%
20 & above	0	0.00
15-19	0	0.00
10-14	5	29.00
5-9	11	64.00
1-4	1	5.00
Total	17	100.00

In terms of number of years in teaching, it can be noted in Table 5 that most of the teachers were not so old in the service because most of them (11 or 64%) belonged to bracket 5-9 years in service. There were also 5 or 29% teachers who are in the service for 10-14 years. These teachers were no longer considered novice in the field of teaching Science. Lastly, only 1 (5%) teacher was considered novice in the teaching endeavor who had been in the service for 1-4 years.

Table 6. Profile of the Science teachers' in terms of the area of specialization

Area of Specialization	f	%
Science	17	100
Total	17	100.00

Table 6 presents the area of specialization of the Science teachers in Surigao Norte National High School. It can be noted that all teachers who

were teaching Science subject were all science majors.

- To what extent is the Spiral Progression Approach in teaching science implemented in reference to vertical articulation, mastery of the subject matter, teaching strategies and availability of instructional materials and laboratory equipment?

Table 7. Extent of the Implementation of Spiral Progression Approach in teaching Science in terms of Vertical Articulation

INDICATORS	Mean	Verbal Interpretation
a. The lessons are easier to understand because the same topics are offered in all grade levels	3.35	Very High
b. The lessons promote seamless transition for students progressing to higher level courses	3.35	Very High
c. There is continuity of lessons in the same area of science in all grade levels	3.29	Very High
d. Same areas of science are discussed in all grade levels	3.29	Very High
e. The topics discussed in the previous years are needed in the present year	3.29	Very High
Over-all Mean	3.31	Very High

Table 7 shows the extent of the implementation of spiral progression approach in Science in terms of vertical articulation as perceived by the participants. Vertical articulation is also known as seamless progression. The participants perceived the extent of implementation as “Very High” with the computed over-all mean of 3.31. This means that the spiral progression approach in teaching science has been implemented successfully, that it bridged the gradual transition of knowledge from one lesson to another, and that students were able to cope the gradual progression of the complexity of the topics in Science.

The teachers perceived very highly that through spiral progression, the students were able to develop their skills and knowledge, which were further reinforced as they advanced to the next level because there was continuity of the lessons. The same result was being depicted in the study conducted by Cabansag (2014). He concluded that students find the topics easy at first and gradually become hard, but there is mastery of the topics because they are discussed in their own pace and longer years to study.Ferido (2013) further reinforced the findings of Cabansag (2014) that learning is extended, reinforced, and broadened each time a concept is revisited.

Table 8 reveals that spiral progression approach had honed the knowledge and teaching skills of the teachers in Science. The extent of implementation was regarded as “Very High” which contributed much to the mastery of the subject matter.

Table 8. Extent of Implementation of Spiral Progression Approach in Teaching Science as to Mastery of the Subject Matter

INDICATORS	Mean	Verbal Interpretation
a. I was able to collaborate with other science teachers and exchange techniques and strategies in teaching the different areas of science	3.29	Very High
b. I can connect the past lessons to the current one made me understand the complex lessons in science.	3.29	Very High
c. Spiral progression as part of K to 12 is C. O student-centered and lessened the tasks of the science teachers	3.24	Very High
d. I was able to familiarize the science concepts which are difficult to the students, and perform intervention to address the problem immediately	3.29	Very High
e. I was able to master the subject matter and give me additional knowledge in the areas of science.	3.29	Very High
Over-all Mean	3.28	Very High

Legend
 Scale
 4 (3.26-4.00)
 3 (2.60-3.25)
 2 (1.76-2.59)
 1 (1.00-1.75)
 Verbal Interpretation
 Very High
 High
 Low
 Very Low

As perceived by the teacher-participants, having four areas of Science to be taught in one school year allowed them to gain mastery of the subject matter not only on their area of specialization but in other areas of science as well. This became possible by the further study and research that they have done in order to teach these properly to their students. Samala (2017) agreed that familiarity of the science lessons was gained by having the same concepts in a specific area in all grade levels attributed to the nature of spiral progression.

Table 9. Extent of Implementation of Spiral Progression Approach in Teaching Science as to Teaching Strategies

Indicators	Mean	Verbal Interpretation
a. Inquiry-based Instruction	3.29	Very High
b. Differentiated Instruction	3.29	Very High
c. Experiential Method	3.29	Very High
d. Cooperative Learning	3.29	Very High
e. Problem solving Method	3.29	Very High
Over-all Mean	3.29	Very High

Legend
 Scale
 4 (3.26-4.00)
 3 (2.60-3.25)
 2 (1.76-2.59)
 1 (1.00-1.75)
 Verbal Interpretation
 Very High
 High
 Low
 Very Low

Table 9 presents the extent of implementation of spiral progression approach in terms of teaching strategies. As seen in Table 9, the teachers perceived “Very Highly” that through spiral progression approach, they were able to employ different effective teaching strategies that are purely student-centered. Bruner (1960) adopts a different view and believes a child is capable of understanding complex information. He further explained how this was possible through the concept of the spiral curriculum. This involved information being structured so that complex ideas can be taught at a simplified level first, and then revisited at more complex levels later on. The spiral progression encouraged teachers to simply facilitate the discussion and monitor the learning and progress of their students just as what Bruner (1960) emphasized that ideally, teaching his way should lead to children being able to solve problems by themselves.

Table 10. Extent of Implementation of Spiral Progression Approach in teaching Science in terms of Availability of instructional materials and laboratory equipment

Indicators	Mean	Verbal Interpretation
a. Laboratory equipment	3.24	Adequate
b. Use of mind-map/concept map/flow chart	3.29	Very Adequate
c. Space for group activities	3.29	Very Adequate
d. Reference books/laboratory manuals	3.24	Adequate
e. Multimedia (videos, PowerPoint presentations movies and the use of laptop and LCD projector)	3.24	Adequate
Over-all Mean	3.24	Adequate

Legend
 Scale
 4 (3.26-4.00)
 3 (2.60-3.25)
 2 (1.76-2.59)
 1 (1.00-1.75)
 Verbal Interpretation
 Very Adequate
 Adequate
 Fairly Adequate
 Not Adequate

Table 10 shows that the instructional materials and laboratory equipment in Science laboratories were “Adequately” available for student consumption with the over-all computed mean of 3.24. Adequate and quality school facilities are basic ingredients for quality education and to achieve the intended goal of the school program (Khan and Iqbal, 2012). Buckley et al., (2004) further states that school facilities enable the teacher to accomplish his/her task as well and help the learner to learn and achieve effectively. With the given results, the implementation of spiral progression approach in Science was clearly manifested because Science laboratories were well equipped with adequate equipment and instructional materials. The teacher was able to design, with appropriate adaptation, a school-based curriculum that nurtures students’ technological

literacy by systematically and comprehensively developing their technological capability, technological understanding and technological awareness, having taken into consideration the students' needs, interests and competencies as well as the actual situation of the school and the strengths of its teachers. The sufficiency of instructional materials and laboratory tools are major components for a meaningful Science learning among students. Hence, the results indicated that the goal of spiral progression in Science teaching were reinforced and achieved because of the adequate availability of these resources (www.teachingstrategies.com).

The over-all extent of implementation of spiral progression approach is described in Table 11. As shown in the Table 11, the teachers perceived that there was a "Very High" manifestation that spiral progression is successfully implemented in the K to 12 Curriculum.

Table 11. Summary on the Extent of Implementation of Spiral Progression Approach in teaching Science as Perceived by the Participants

INDICATORS	Mean	Verbal Interpretation
Vertical articulation	3.31	Very High
Mastery of the subject matter	3.28	Very High
Teaching strategies	3.29	Very High
Availability of instructional materials and laboratory equipment	3.24	Adequate
Grand Mean	3.28	Very High

Legend

Scale	Verbal Interpretation
4 (3.26-4.00)	Very High
3 (2.60-3.25)	High
2 (1.76-2.59)	Low
1 (1.00-1.75)	Very Low

Teaching is more integrative and multidisciplinary in the spiral progression approach because it enables students to connect disciplines. And also the topic may be progressively elaborated when it is reintroduced leading to a broadened understanding and transfer (Mantiza, 2013). The teachers too are well exposed to different disciplines that broader their understanding and knowledge. Teachers were also capacitated with the appropriate teaching strategies that best suit to the needs of the students under spiral progression approach, the students have access also to variety of laboratory equipment, tools and instructional materials.

3. Is there a significant relationship between profile of the Science teachers and the implementation of Spiral Progression Approach in teaching science?

Table 12. Significant Relationship between the Profiles of the Science teachers and the Implementation of Spiral Progression Approach in teaching Science

Profile of the respondent	Spiral progression approach	c-value	p-value	Interpretation
Age	Vertical articulation	0.726	0.09	Insignificant
	Mastery of the subject matter	0.632	0.254	Insignificant
	Teaching strategies	0.61	0.121	Insignificant
	Availability of instructional materials and laboratory equipment	0.632	0.254	Insignificant
Highest Educational Qualification	Vertical articulation	0.405	0.107	Insignificant
	Mastery of the subject matter	0.343	0.177	Insignificant
	Teaching strategies	0.340	0.182	Insignificant
	Availability of instructional materials and laboratory equipment	0.350	0.168	Insignificant
Relevant Trainings	Vertical articulation	0.491	0.045	Significant
	Mastery of the subject matter	0.496	0.043	Significant
	Teaching strategies	0.485	0.048	Significant
	Availability of instructional materials and laboratory equipment	0.524	0.031	Significant
Years in Service	Vertical articulation	0.274	0.288	Insignificant
	Mastery of the subject matter	0.277	0.282	Insignificant
	Teaching strategies	0.271	0.294	Insignificant
	Availability of instructional materials and laboratory equipment	0.292	0.255	Insignificant

Legend: p-value>0.05, accept Ho; insignificant
p-value < 0.05, reject Ho; significant

It was hypothesized that there was no significant relationship between the teachers' profile and the extent implementation of spiral progression in teaching science. As disclosed in Table 12, there exists no significant relationship between the profiles of the participants as to age, gender, highest educational qualifications, years in service and specialization. The computed p-levels were greater than the p-value of 0.05. This implies that the perceptions of the Science teachers on the extent of implementation of spiral progression approach were not affected or influenced by the profiles. Regardless of age, gender, educational qualifications they achieved, tenure of their teaching and specializations they are in, teachers' perception on the extent of implementation of spiral progression in teaching Science is deemed independent on the hindering and facilitating factors such as profiles and thereby not influenced at any cost.

As revealed further in Table 12, the computed p-level of the profile as to relevant trainings attended was less than the p-value of 0.05. This signifies that there was a significant relationship between the relevant trainings attended and the

perceptions of the participants as to the extent of implementation of spiral progression approach in teaching Science. This means that the learning gained by the teachers in attending trainings and seminars initiated by the Department of Education has contributed to the positive perspective of the teachers towards the implementation of spiral progression approach in Science. Teachers have high hopes that the spiral progression approach will further augment the knowledge gained by the students and just as Martin (2008) stated that spiral curriculum is a design framework which will help science teachers construct lessons, activities or projects that target the development of thinking skills and dispositions which do not stop at identification. The trainings teachers have attended enrich their understanding on the concepts of spiral progression. New activities were introduced. Angeles (2013) added that the new curriculum is composed of exposed activities like, collaborative learning, peer tutoring, outcome-based performance or performance task in which the students are exposed to socializing, sharing thoughts and ideas or brainstorming, communicating, expressing their multiple intelligences, abilities and skills. In this same manner, the idea in spiral progression approach is to expose the learners into a wide variety of concepts or topics and disciplines, until they mastered it by studying it over and over again but with different deepening of complexity. Teachers learned all these from the trainings they attended and hence, widen their perspectives as to the implementation of spiral progression in teaching Science.

CONCLUSION

In summary, Teachers in this study were middle-aged, all are female and considered experienced teachers in the field of Science. With regards to highest educational qualification, most of the teachers earned MS/MA units but most of the teachers lacked relevant trainings and seminars in national and international levels. Hence, the Science teachers of Surigao del Norte were all competent, well-equipped with the right knowledge and experts in their fields. Furthermore, the Science teachers believed that the implementation of spiral progression approach as an effective way of bridging the complexity of the topics in Science as it entails gradual scaffolding of the level of difficulty in teaching Science. Teachers perceived that through spiraling upwards, the students can connect to prior knowledge and so with the teach-

ers, they will gain mastery on the subject matter.

Relevant trainings create a positive view on the perspectives of the teachers. The underpinnings of having spiral progression in the curriculum are being internalized by the teachers, making them active agents in the full implementation of the approach in Science teaching.

RECOMMENDATION

1. Results of this study will help guide educators and curriculum planners in the development of curriculum materials which would best suit the teacher's competencies in imparting knowledge using the spiral progression approach in teaching science.
2. Knowledge of the results of the study would provide principals information on the adequacy and efficiency of science teaching. They would then see into what areas they would channel the greater bulk of their supervisory functions and enable them to design way and means to carry them out.
3. Results of this study would provide teachers innovative techniques in improving the teaching-learning processes on science teaching.
4. The students are the end beneficiaries of this study, for they would be provided with the best learning atmosphere by their teachers through the principal's follow-up and monitoring activities to enhance science teaching.
5. Result of this study paves a way for further researches that would help in providing best learning environment.

Proposed Intervention Plan for Secondary Science Teachers

ACTIVITIES	OBJECTIVES	PERSONS INVOLVED	MATERIALS/EQUIPMENT NEEDED
1. Learning Action Cell	To foster cooperative learning among teachers through sharing of ideas, expertise, and knowledge on the different topics in Science	Science Teachers per level	Materials and equipment, chalk and board
2. Scholarships	To promote professional and career development through availing scholarships initiated by DepEd and external agencies and organizations	Science Teachers, LGU, SDS and Focal Persons	Application forms, endorsement letters
3. Relevant trainings on Teaching Science	To enhance teachers performance on the spiral approach of teaching Science to all levels	Science teachers, secondary students	TG, LM. Training materials
4. Science camps and Competitions	To involve teachers in nurturing students' progress through social gatherings, for a healthy competitions	Science Teachers, students	Reviewers, learning materials

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EFFECTIVENESS OF THE DEVELOPED CONTEXTUALIZED LEARNING MATERIAL (CLM) FOR TEACHING PLUMBING NC II

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ABSTRACT

The object of this study is to develop and validate a contextualized Learning Material (CLM) for teaching Plumbing NC II. It also evaluates the effectiveness of the developed CLM to the competency level of the Grade 11 and 12 students. The present study made use of the quantitative type of research as it hoped to design and development research approach to establish an empirical basis for the creation of instructional products. In particular, the researcher utilized the ADDIE (Analysis, Design, Development, Implement, and Evaluate) Model in developing the learning materials. The respondents of this study were 10 Teachers/Facilitators and 10 Assessors 23 students in Plumbing NC II of Agusan del Norte Division utilizing a researcher-made questionnaire adopted from the previous related study. Result revealed that the perception in the Contextualized Learning Material (CLM) of Plumbing trainers/assessors resulted to an acceptable rating of very good and, the validated instrument and the evaluation of the CLM reveals a positive outcome since both CVI and FVI were greater than 0.75 thus suggested that the CLM is accepted without revision. Thus, it was also found out that in the implementation phase, a higher mean difference occurred between pretest and posttest in utilizing the CLM. which supported the claims that the design and development of Contextualized Learning Material for teaching Plumbing NC II, improves the performance of students in different competencies. Therefore, the study recommends the wide dissemination of its findings and integrate them in the learning process.

Keywords: Competency, Contextualized Learning Materials, Plumbing NCII, Validation.

INTRODUCTION

Learning materials are important tools in the teaching and learning process. They serve as useful guides in the delivery of instruction (Abolade, 2009) and can enhance students' performance and interesting the lesson (Adebule&Ayoola, 2009). Such materials like worktexts, workbooks, and modules are deemed necessary to support students' learning with different backgrounds, abilities and styles (Agorilla, 2015).

With the implementation of the K to 12 curricula in the Philippines, teachers in all subject areas are expected to adjust their pedagogies based on their respective social and educational contexts. This is in response to the implementing rules of RA 10533 mandating the contextualization of the curriculum which is "flexible enough to enable and allow schools to localize, indigenize, and enhance the same" (Rule II, section 10.2h). To contextualize curriculum, Utech (2008) suggested that classroom teachers must use genu-

ine materials, activities, interests, issues and needs from the lives of their students to help them learn, practice and evaluate specific skills and competencies.

Contextualized learning materials (CLMs) would allow students to process new concepts in such a way that it makes sense to them in their own frames of reference. Studies have shown that students favored the use of CLMs due to the presence of their mother-tongue language (Morales, 2014), representation of their culture and values (Acorda & Furigay, 2015), and improvement in their achievement scores (Iji, et., al, 2014). The studies she reviewed suggest that teachers have to work and learn together across disciplines to implement contextualization. Further, Olumorin et al. (2010) recommended that teachers should attempt to produce improvised materials for their teaching from local resources.

Since the country has a very varied culture across its sixteen regions, the available textbooks provided to the students may not cater to their

local needs. The materials contained from these books may be irrelevant to the learners' needs (Tomlinson, 2003). This is particularly the case in Plumbing NC II where the lesson exercises are not suited to the context of students' lived experiences. Hence, there is a need for CLMs to be constructed.

Hence, it is essential for students to learn and master the competencies in the early grade for one skill may be a pre-requisite to another. Thus, teachers should not just be equipped with teaching strategies and techniques but they should also be armed with appropriate instructional materials such as Contextualized Learning Materials (CLM) which was given highlight in this study.

Objectives of the study

The object of this study is to develop and validate a contextualized Learning Material (CLM) for teaching Plumbing NC II.

Specifically, it seeks to present the following data:

1. Content and Face Validity of the developed CLM.
2. Effectiveness of the develop CLM to the competency level of the Grade 11 and 12 students.

Flow of the study

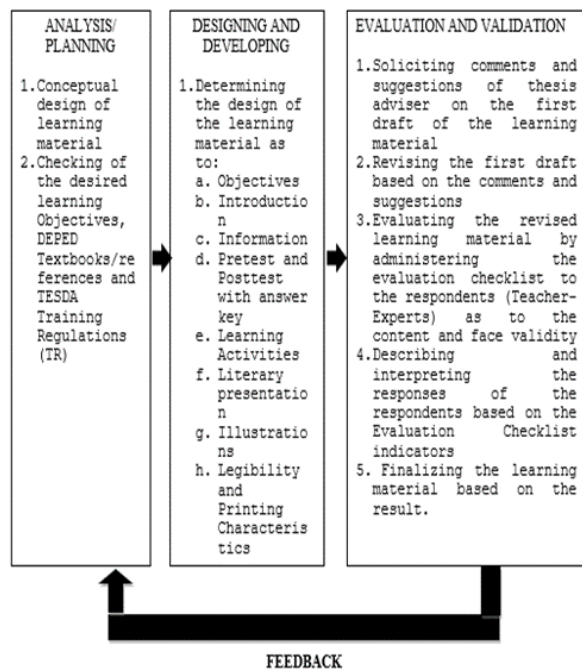


Figure 1
Research Paradigm

METHODOLOGY

Research Design and Development

The present study made use of the quantitative type of research as it hoped to design and development research approach to establish an empirical basis for the creation of instructional products, i.e., learning materials. In particular, the researcher utilized the ADDIE (Analysis, Design, Development, Implement, and Evaluate) Model in developing the learning materials.

This type of research was suitable for this study because it will describe the responses of the identified respondents on their perceptions on the validity using researcher - made evaluation questionnaire.

This study underwent evaluation on a varied number of parameters specifically to the identified respondents. Data and information as part of objective evaluation will be gathered and interpreted by the researcher to test and validate in the terms of the pre-determined criteria set forth in the conceptualization of the study. A 5-point Likert scale was used to quantify responses of the evaluators, with 5 being the highest and 1 being the lowest.

Research Environment

This study was conducted in selected secondary schools in Surigao Del Norte Division, Surigao del Norte.

Respondents

The respondents of this study were 10 Teachers/Facilitators, 23 students and 10 Assessors/Experts in Plumbing NC II of the different schools in the Surigao del Norte Division.

Research Instrument

The instrument used in the conduct of the study was a researcher-made checklist presented on Appendix A. The checklist addresses the content validity and face validity of the learning material to assess respondents' feedbacks and suggestions.

In gathering relevant data in this study, the researcher employed the Experts' Evaluation Checklist on of the Contextualized Learning Materials to have a basis for determining the validity of the developed Contextualized Learning Materials. A five-point Likert checklist was adapted from the theses of Marin (2003) and Marasigan (2003). Some modifications on the item format were made to better align them with the purpose of the study. Revisions were validated by the re-

spondents.

The checklist was divided into two parts. Part I is the content validity and the Part II deals on face validity of the learning material as to the literary presentations and illustrations.

RESULTS AND DISCUSSIONS

Table 1 Evaluation on Content Validity of the Developed Contextualized Learning Materials (CLM) as perceived by Plumbing NC II Teachers/Trainers

Item	Content Validity	Mean	QD
1	The objectives are consistent with those found in the most recent approved syllabus and curriculum guide	3.8	Very Good
2	The pretest and posttest assess the cognitive/psychomotor skills reflected in the objectives	4.0	Very Good
3	The contents of the introduction can motivate the learner towards the contents of the learning activities	4.0	Very Good
4	The contents of the learning activities are aligned with the objectives	3.8	Very Good
5	The contents of the module agree with generally accepted body of knowledge	4.0	Very Good
6	The learning and assessment activities can be reasonably achieved within the specified time allocation	4.0	Very Good
7	The self-evaluation highlights important competencies which may need more time to master	3.8	Very Good
8	The concepts reviewed are aligned with the important competencies highlighted in self-evaluation	3.8	Very Good
9	Correct answer's key for self-evaluation is provided	3.8	Very Good
10	Content is free of moral, cultural, religious, racial, and/or gender biases.	4.0	Very Good
	Composite mean	3.9	Very Good

The table 1 shows the content validity of the CLM as perceived by Plumbing Teachers/Trainers. Most of the teachers have a common rating of very good with a composite mean of 3.9, the evaluators seemingly agreed that the CLM is acceptable with a very good rating.

Table 2. Evaluation on Face Validity of the Developed contextualized learning materials (CLM) as perceived by Plumbing Teachers/Trainers

Item	Criteria	Mean	QD
A. Literary Presentation			
1	Language is conventional and at least 50% of the material is written in the active voice	3.4	Very Good
2	Headings and subheadings use relevant words which capture the concepts that they represent	3.8	Very Good
3	Ideas are concisely expressed	4.0	Very Good
4	Instructions are clear	3.6	Very Good
5	Technical terminologies are adequately defined	3.8	Very Good

B. Illustrations			
1	Appropriate illustrations such as tables, graphs, diagrams, drawings, and/or pictures are used	4.0	Very Good
2	Illustrations are logically sequenced	3.6	Very Good
3	Illustrations can develop curiosity and critical thinking	3.4	Very Good
4	Illustrations are related and strategically integrated within the text	4.0	Very Good
5	Illustrations are properly labeled and described	3.8	Very Good
C. Legibility and Printing Characteristics			
1	Font size of the letters is adequate and consistent with prescribed format	4.0	Very Good
2	Font style of the letters is adequate and consistent with prescribed format	3.4	Very Good
3	Margin and spacing between lines and paragraphs are adequate and consistent with prescribed format	4.0	Very Good
4	Boldfaced characters and bullet points are used to draw attention to specific points or key content	3.8	Very Good
5	There is a good contrast between the printed content and background, the colors, and figures used	3.8	Very Good
	Composite mean	3.8	Very Good

Legend	Descriptive Format
Rating Scale	Strongly Agree/Excellent
3.26 - 4.00	Agree/Very Good
2.51 - 3.25	Disagree/Fair
1.76 - 2.50	Strongly Disagree/Poor
1.00 - 1.75	

In addition, the above table shows the perception of the evaluators with respect to face validity. It can be gleaned that the composite mean of 3.8 covering the Literary Presentation with 3.8 in the Illustrations and a composite mean of 4.0 in the Legibility and Printing Characteristics with general rate of very good.

Table 3. Evaluation on Content Validity of the Developed contextualized learning materials as perceived by Plumbing Assessors/Experts

Item	Content Validity	Mean	QD
1	The objectives are consistent with those found in the most recent approved syllabus and curriculum guide	3.8	Very Good
2	The pretest and posttest assess the cognitive/psychomotor skills reflected in the objectives	3.8	Very Good
3	The contents of the introduction can motivate the learner towards the contents of the learning activities	4.0	Very Good
4	The contents of the learning activities are aligned with the objectives	3.8	Very Good
5	The contents of the module agree with generally accepted body of knowledge	3.8	Very Good
6	The learning and assessment activities can be reasonably achieved within the specified time allocation	4.0	Very Good
7	The self-evaluation highlights important competencies which may need more time to master	4.0	Very Good
8	The concepts reviewed are aligned with the important competencies highlighted in self-evaluation	3.8	Very Good
9	Correct answer's key for self-evaluation is provided	3.6	Very Good
10	Content is free of moral, cultural, religious, racial, and/or gender biases.	3.8	Very Good
	Composite mean	3.8	Very Good

The table shows the perception of the assessors or experts with respect to content validity of the CLM. Having a composite mean of 3.8 confirms a very good rating from the evaluators. This suggested that most of the items in the different competencies were acceptable as perceived by the assessors or experts.

Table 4. Evaluation on Content and Face Validity of the Developed contextualized learning materials as perceived by Plumbing Assessors/Experts

Item	Criteria	Mean	QD
A. Literary Presentation			
1	Language is conventional and at least 50% of the material is written in the active voice	3.4	Very Good
2	Headings and subheadings use relevant words which capture the concepts that they represent	3.8	Very Good
3	Ideas are concisely expressed	4.0	Very Good
4	Instructions are clear	3.6	Very Good
5	Technical terminologies are adequately defined	3.8	Very Good
B. Illustrations			
1	Appropriate illustrations such as tables, graphs, diagrams, drawings, and/or pictures are used	4.0	Very Good
2	Illustrations are logically sequenced	3.6	Very Good
3	Illustrations can develop curiosity and critical thinking	3.4	Very Good
4	Illustrations are related and strategically integrated within the text	4.0	Very Good
5	Illustrations are properly labeled and described	3.8	Very Good
C. Legibility and Printing Characteristics			
1	Font size of the letters is adequate and consistent with prescribed format	4.0	Very Good
2	Font style of the letters is adequate and consistent with prescribed format	3.4	Very Good
3	Margin and spacing between lines and paragraphs are adequate and consistent with prescribed format	4.0	Very Good
4	Boldfaced characters and bullet points are used to draw attention to specific points or key content	3.8	Very Good
5	There is a good contrast between the printed content and background, the colors, and figures used	3.8	Very Good
Composite mean		3.8	Very Good

Legend
Rating Scale
 3.26 - 4.00
 2.51 - 3.25
 1.76 - 2.50
 1.00 - 1.75

Descriptive Format
 Strongly Agree/Excellent
 Agree/Very Good
 Disagree/Fair
 Strongly Disagree/Poor

Table 5. Evaluation on Content and Face Validity Developed Learning Materials as validated by the Plumbing Assessors/Experts.

Topics/competencies	CVI	CVA	FVI	Decision
Participate in workplace communication	0.85	77	0.95	Accepted without revision
Work in a team environment	0.95	78	0.95	Accepted without revision
Practice career professionalism	0.90	80	0.90	Accepted without revision
Practice occupational health and safety	0.90	77	0.85	Accepted without revision
Safety welding practices	0.95	76	0.95	Accepted without revision
Essentials of welding	0.85	80	0.95	Accepted without revision
International welding codes and standards	0.95	77	0.80	Accepted without revision
Acceptable and unacceptable weld profile	0.90	78	0.80	Accepted without revision
Weld defects, causes and remedies	0.90	78	0.80	Accepted without revision
Welding procedure specification	0.95	76	0.80	Accepted without revision
Welding techniques and procedure	0.85	77	0.95	Accepted without revision
Weld carbon steel pipes inclined at 45° fixed position (6g)	0.80	78	0.80	Accepted without revision

CVI	FVI	Decision
≥0.80	≥0.75	Accepted without revision
≥0.80	<0.75	Accepted but factors of face validity must be improved
>0.70 but <0.80	≥0.75	Must be revised based on items with low CVI(s)
>0.70 but <0.80	<0.75	Must be revised based on items with low CVI(s) and FVI(s)
<0.70		Rejected regardless of FVI

Table 5 shows the results of the computation of the CVI, CVA and FVI as rated by the experts. CVI represents the content validity index where the number of experts who rated 4 or 3 were counted and divided by the total number of expert raters for every item in different competencies. Also, the CVA is the content validity of achievement where the ΣX is the total score or ratings of the expert divided by the maximum total score or ratings multiplied by 100%. Similarly, the FVI is the face validity index where the number of experts who rated 4 or 3 were counted and divided by the total number of expert raters for every item. Revealing the results in every topic as to CVI of ≥ 0.80 and FVI is ≥ 0.75 . Hence, majority of the decision of the evaluator of the CLM is accepted without revision.

Table 6. Comparison of the Mean Scores of the Grade Eleven and Twelve students before and after utilizing Contextualized Learning Material (CLM) in Basic competencies

Grade 11

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing	4.1742	1.76262	Fairly satisfactory	8.4621	131	38.172	0.000	significant
After Utilizing	12.6364	1.55937	Outstanding					

Grade 12

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing CLM	5.111	1.46187	Fairly satisfactory	7.2870	107	36.206	0.000	significant
After Utilizing CLM	12.40	1.47844	Outstanding					

Significance level $\alpha=0.05$

Table 6 presents the comparison of the mean scores of the Grade Eleven and grade twelve students in basic competencies before and after utilizing Contextualized Learning Material (CLM). The data show the computed mean in grade eleven for pretest and posttest are 4.1742 and 12.6364 respectively. The mean difference is 8.4621. It also shows the computed t-value of 38.172 and a p-value of 0.000 which is lesser than the prescribed level of significance of 0.05. Similarly, in the grade twelve a mean difference of 7.2870 and a p-value of 0.000 are also lesser than the prescribed 0.05 level of significance. This suggested that the utilization of the developed CLM affect the increase in the performance of the students.

Table 7. Comparison of the Mean Scores of the Grade Eleven and Twelve students before and after utilizing Contextualized Learning Material (CLM) in Common competencies.

Grade 11

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing CLM	4.6667	1.20854	Fairly satisfactory	7.7422	131	46.030	0.000	significant
After Utilizing CLM	12.4091	1.45127	Outstanding					

Grade 12

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing CLM	3.694	1.13942	Fairly satisfactory	8.95370	107	42.817	0.000	significant
After Utilizing CLM	12.65	1.56070	Outstanding					

Table 7 presents the comparison of the mean scores of the Grade Eleven and grade twelve students before and after utilizing Contextualized Learning Material (CLM). The data shows the mean difference is of 7.74242 and 8.95370 respectively. It also shows the computed t-value of 46.030 and 42.817. Since both of the data reveals a p-value of 0.000 which is lesser than the prescribed level of significance of 0.05. This suggested that the utilization of the CLM is very much acceptable in Common competencies.

Table 8. Comparison of the Mean Scores of the Grade Eleven and Twelve students before and after utilizing Contextualized Learning Material (CLM) in Core competencies.

Grade 11

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing CLM	4.5000	1.58476	Fairly satisfactory	8.15909	131	38.724	0.000	significant
After Utilizing CLM	12.6591	1.73350	Outstanding					

Grade 12

	Mean	Standard Deviation	Interpretation	Mean Difference	Degree of Freedom	Computed t-value	P-value	Interpretation
Before Utilizing CLM	3.7593	1.44604	Fairly satisfactory	8.2963	107	45.363	0.000	significant
After Utilizing CLM	12.0556	1.26663	Outstanding					

The above table shows the Comparison of the Mean Scores of the Grade Eleven and Twelve students before and after utilizing Contextualized Learning Material (CLM) in Core Competencies. The data shows a mean difference of 8.15909 in

grade eleven and 8.2963 in grade Twelve. It also shows in both tables a p-value of 0.000 that is lesser compare to the 0.05 significance level.

CONCLUSIONS AND RECOMMENDATIONS

Findings

On the basis of the gathered data in relation to the objectives of this study, the following are the significant findings:

1. It was found out that competencies identified for design and development of Contextualized Learning Material (CLM) for teaching Plumbing NC II. Showed that majority of the students' results gathered a fairly satisfactory ratings which established the design and development of Contextualized Learning Material (CLM) for teaching Plumbing NC II.
2. The perception in the Contextualized Learning Material (CLM) of Plumbing trainers/ assessors yielded a common evaluation, thus resulted to an acceptable rating of very good.
3. This study found out that using the criteria set and equation for the computation of CVI and FVI, the validated instrument and the evaluation of the CLM reveals a positive outcome since both CVI and FVI were greater than 0.75 thus suggested that the CLM is accepted without revision.
4. It was also found out that in the implementation phase, a higher mean difference occurred between pretest and posttest in utilizing the CLM. Which supported the claims that the design and development of Contextualized Learning Material for teaching Plumbing NC II, improves the performance of students in different competencies.

CONCLUSION

Based on the analysis of the data that were gathered, the researcher was able to design and develop a contextualized Learning Material for Teaching Plumbing NC II. Following the ADDIE model and using the criteria set even in the time constraint amid COVID19 pandemic, still the researcher was able to test it on the intended recipients. Based also on the evaluation results, a positive perception from the teachers and assessors helped to further enhancement and satisfy the standard in facilitating learning.

RECOMMENDATIONS

Premised on the findings and conclusions, the study recommends the wide dissemination of its findings and integrate them in the learning process.

Specifically, the study advances the following recommendations.

1. Future researchers can improve the content of the LM by integrating the 21st-century skills without neglecting the culture and learning environment of the learners;
2. Continue this study and apply it to different classroom setting to test its learning effectiveness;

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