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# LARVICIDAL EFFECT OF *Jatropha curcas* (TUBA-TUBA) BARK ETHANOLIC EXTRACT AGAINST *Aedes aegypti* LARVAE

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## ABSTRACT

This study aimed at determining the larvicidal activity of *Jatropha curcas* (Tuba-tuba) bark ethanolic extract against *Aedes aegypti* larvae. *Aedes aegypti* is a widely known vector of dengue that claims much death annually. Thus the objective of this study is to determine the physicochemical properties of *Jatropha curcas* extract of its larvicidal effect against *Aedes aegypti* larvae. The study utilizes an experimental design where a comparison of the number of larvae exposed to the different concentrations of the extract to the number of larvae exposed to the negative and positive controls is done. Preliminary tests such as Physicochemical tests, Iodoform test, Thin Layer Chromatography (TLC), and Mosquito Larvae Bioassay were done. The TLC procedure showed positive levels of alkaloid. After the performance of the Bioassay, the alternative hypothesis was accepted since the statistical data confirmed that there is a significant difference between *J. curcas* bark ethanol extract against *Aedes aegypti* larvae when compared to the positive control. At 24 hours of contact exposure, 100 ppm, 200 ppm, and 400 ppm significantly differed with the positive control. At 48 hours, only 100 ppm and 200 ppm have displayed a significant difference. Lastly, there was no significant difference between the mean mortality rates of the mosquito larvae across concentrations after 24 hours against 48 hours. The researchers further recommended for further study the identification and quantification of an alkaloid fraction of the extract using High-Performance Liquid Chromatography (HPLC) and to determine its effectiveness as an isolate.

*Keywords: Aedes aegypti, dengue mosquito, J curcas, Larvicidal Activity, Tuba-tuba*

## INTRODUCTION

The World Health Organization (WHO) presented in 2017 that 17% of the world's burden on communicable diseases can be attributed to vector-borne diseases with estimated 700,000 annual mortality. They can transmit malaria, dengue, lymphatic filariasis, and Japanese encephalitis. A report from WHO in 2015 revealed that there was a 30-fold increase in the worldwide incidence of dengue. Furthermore, WHO declared in 2016 the emerging microcephaly and neurological disorders brought about by the Zika virus transmitted

by mosquitoes in Latin America and the Caribbean as a public health emergency of international concern. In the study conducted by Testa (2017) in Pacific countries such as New Zealand, Vanuatu, and Fiji, it revealed that climate change brought the surge of mosquito-borne diseases like dengue, malaria, and even zika to a new level. This 2018, Flies, together with Lau, Carver, and Weinstein are currently working on the possible emergence of a new mosquito-borne disease caused by the Ross River virus that is endemic in Australia and Papua New Guinea.

From 2000 to 2011, the reported number of cases of dengue disease fluctuated with an overall increase in cases over time. In the regions of the Philippines, the incidence of dengue disease varied, with particularly high incidences observed in the regions of the island of Mindanao. This increase may be contributed to the rapidly growing population, increasing urbanization, improvements in surveillance, and the limited success of vector control measures seen in the country (Bravo, Roque, Brett, Dizon, & L'Azou, 2014). Moreover, during the first half of 2017, Junio presented that the Department of Health (DOH) of the Philippines reported in their Dengue Disease Surveillance that there was a total of 43,770 dengue cases in the country. With these threats, control measures are directed on breaking the transmission cycle of the disease (Kumar, Wahab, Mishra, & Warikoo, 2012). The Center for Disease Control and Prevention (CDC, 2018) mentioned that the often-used approach in mosquito control is an Integrated Mosquito Management (IMM) or Integrated Vector Management (IVM). These include mosquito larvae and pupae in treating water-holding structures and containers situated in public areas as the control. However, throughout the years, chemical insecticides have been used and posed new threats such as insecticide resistance, the reemergence of pest species, environmental pollution, toxic hazards to humans, and non-human targets (Kumar et al., 2012). These threats have propelled researchers to venture on plant alternatives for they possess bioactive chemicals such as saponins, steroids, isoflavonoids, essential oils, alkaloids, and tannins that are potential mosquito larvicides (Shivakumar, Srinivasan, & Natarajan, 2013). Plant species under *Jatropha* contains bioactive compounds that have been applied against many pathogenic microorganisms (Rampadarath, Puchooa, & Sanmukhiya, 2010).

Due to the previous study done by Rampadarath, Puchooa, and Jeewon (2016) on *Jatropha curcas* mature bark, their phytochemical screening revealed the presence of alkaloids, coumarins, flavonoids, tannins, and phenol in the bark extract. Moreover, their study has concluded the plant's potential to induce larvicidal activity against fruit fly larvae. These circumstances have led the researchers to explore the potential of *Jatropha curcas* (tuba-tuba) bark extract to induce larvicidal activity against *Aedes aegypti* larvae. The researchers made use of ethanol (Alvarez, Heralde & Quiming, 2016) as an extracting agent in the preparation of the *Jatropha curcas* (tuba-tuba) bark extract used in the study.

## Objectives of the Study

This study aimed to determine the larvicidal properties of *Jatropha curcas* extract against mosquito larvae. Specifically, this study aimed to determine the following.

1. The physicochemical property of *Jatropha curcas* bark ethanolic extract in terms of Percentage Yield, Solubility, and pH.
2. Determine the significant difference in the mortality rate of mosquito larvae across the following treatments after 24 and 48 hours in terms of Positive control, and Negative control, *Jatropha curcas* bark extract at concentrations of a. 1,000 ppm, 800 ppm, 400 ppm, 200 ppm, and 100 ppm
3. Determine the significant difference in the mortality rate of the mosquito larvae under the following time differentials? 24 hours, and 48 hours.

## Hypothesis

Ha: There is a significant difference between *J. curcas* bark ethanol extract against mosquito larvae when compared to the positive control.

## Review of Literature

### **J curcas**

According to Akhilesh Kumar and S.K. Tewari (2015), *Jatropha curcas* is a multipurpose perennial shrub/small tree of 3-6 m height. There are many uses of *Jatropha curcas*; as stated by Lee (2013), the parts of *J. curcas* were used in veterinary purposes and also in traditional medicine such as treating bacterial and fungal infection. In a study conducted by Igbinsola, Igbinsola, and Aiyegoro (2009), the presence of secondary metabolites such as saponins, steroids, tannins, glycosides, alkaloids, flavonoids were discovered during a phytochemical screening of *J. curcas* stem bark. The team also pointed out that these compounds are considered biologically active, thus aid the antimicrobial mechanisms of *J. curcas*. Similar studies on bark extract have proved to accelerate wound healing in albino rats (Shetty, Udupa S., Udupa A., and Vollala, 2006), and as an anti-oxidant (Igbinsola et al., 2011).

Phytochemical screening of *J. curcas* bark extracted using ethanol revealed the presence of saponins, steroids, tannins, glycosides, alkaloids, and flavonoids (Wakirwa, Ibrahim and Madu,

2009). These compounds play important roles in the defense mechanism of plants against many microorganisms, insects and other herbivores. The secondary metabolite compound, alkaloids which were observed in *J. curcas* was widely present in the plant. One of the common biological properties of alkaloids is their toxicity against cells of foreign organisms. Different parts of the *J. curcas* such as the seeds, roots, leaves and bark were found to contain toxic alkaloid curcin and phorbol esters which prevent animals from feeding on it. Hence, the presence of these compounds in *J. curcas* allowed Rampadarath, Puchooa and Jeewon (2016) to correlate the results of the phytochemical test with the antimicrobial activities and larvicidal effects observed in their experiment.

According to Wansi and Kuete (2013), alkaloids are a class of naturally occurring organic nitrogen-containing bases that are one of the most diverse groups of secondary metabolites found in plants, marine organisms, and microorganisms. They have an array of structural types, biosynthetic pathways, and pharmacological activities. Phytochemical screening revealed that alkaloids are present in *J. curcas* bark. Larvicidal activity of four alkaloids has been extracted from *Zanthoxylum lemairei* against the malaria vector *Anopheles gambiae* results showed that the percent mortality of 100% was observed at a concentration of 500 mg/L (Talontsi, Matasyoh, Ngoumfo, & Chepkorir, 2010).

### **Aedes aegypti**

The Centers for Disease Control and Prevention (2018) described *Aedes aegypti* as a small, dark mosquito with white lyre shaped markings and banded legs. Most frequently found in tropical and subtropical areas of the world, *Aedes aegypti* historically is considered to be a primary vector of viral diseases such as dengue fever, chikungunya and yellow fever. *Aedes aegypti* is extremely common in areas lacking piped water systems and depends greatly on water storage containers to lay their eggs. Male and female adults feed on the nectar of plants; however, female mosquitoes need blood in order to produce eggs and are active in the daytime. Eggs have the ability to survive drying for long periods of time, allowing eggs to be easily spread to new locations.

According to the Zapata, G. (2015), the larval stages of the mosquito also known as instars can be classified into 4 stages based on their sizes which is also influenced by food and temperature. The 1st instar has a length of 0.5 to 1.5 mm, 2nd

instar has an increased length from 1.5 to 2.5 mm, 3rd instar ranges from 2.5 to 3.5 mm and the 4th instar has a length greater than 3.5 mm. The sizes can also depend on laboratory conditions. Younger larvae like the first and second instar larvae do provide more sensitive targets but are less likely to live in difficult conditions and are unable to survive much more than 24 hours without food. On the other hand, the late third and early fourth instars are the larval groups that enable good survival in controls and provides consistent results (Lacey, 2012).

## **METHODS**

Presented are the design, measures, setting, subjects, data analysis, procedures, limitations, and ethical considerations of the proposed study.

### **Design**

This study used an experimental design wherein there is the comparison of the number of larvae exposed to the different concentrations of *Jatropha curcas* bark ethanol extract of the experimental group, to the number of larvae exposed in the malathion as the positive control, and to the number of larvae exposed in distilled water as the negative control. This counting was based on the number of dead larvae on the culture media. Exposure to these concentrations was also subjected to different time intervals.

The study was limited to the determination of the larvicidal ability of *J. curcas* bark ethanolic extract against *Aedes aegypti* 3rd to 4th instar larvae. Laboratory experimentation and analysis is limited only to the larvicidal property of this plant. The study focuses on *Aedes aegypti* mosquitos in their larval stage specifically that of the 3rd to 4th instar and not in their adult stage. Moreover, for the screening for the presence of alkaloid the extract, the study was limited to the qualitative test, Thin-Layer Chromatography.

### **Measures**

Larvicidal activity of *J. curcas* was measured using the different concentrations of *J. curcas* bark ethanol extract. One thousand parts per million, 800ppm, 400 ppm, 200 ppm, and 100 ppm were used in order to compare larvicidal activity with the control and determine the smallest concentration at which it can cause larval mortality.

The statistical tools used in the study included Arithmetic Mean for the triplicates, Kruskal-Wallis Test to determine the significant differ-

ence, and Post-Hoc Analysis using Bonferroni Test to determine which treatment significantly differs.

Thin-layer chromatography (TLC) was used to separate the components of the *Jatropha curcas* extract using a thin stationary phase supported by an inert backing.

### Data Analysis

The data collected was analyzed according to the results of the varying concentrations (1,000 ppm, 800 ppm, 400 ppm, 200 ppm, and 100 ppm) of *J. curcas* bark ethanolic extract induced the mortality of the mosquito larva. The mortality rate was computed using the Arithmetic Mean. Since the gathered data was not normally distributed (non-parametric), Kruskal–Wallis test was employed to determine the significant difference in the mortality rate of the mosquito larvae across the different treatments. Post-Hoc Analysis using the Bonferroni test was then performed to find out which among the treatments significantly differ. On the other hand, to test for the significant difference between the mortality rate in 24 hours and 48 hours, a Two-Sampled Independent Sample t-Test was performed.

### Procedure and Preparation of Plant Extract

Thoroughly washed the plants' parts under running tap water and allowed to dry in the shade. An exhaustive extraction method was used. The bark was air-dried, grounded to powder and macerated in ethanol separately for a span of 3 days to soften the plant material to released soluble phytochemicals (Azwanida, 2015). The solvent was filtered every 24 hours and replaced with a new one until the third day. The extracts were then filtered on 15–18 mm pore size Whatman filter paper (Rampadarath et al., 2016). The rotary evaporation process was performed to separate the solvent from the active ingredient and was then lyophilized. To determine that the extract was free from ethanol solvent, the Iodoform test was done to make sure that ethanol can be excluded as a component that may contribute to the larvicidal activity. The Thin-Layer Chromatography was used to analyze the presence of alkaloids as the active ingredients.

After the extraction method, the next was to rear mosquito larvae of known age or instar as the subject of the larvicidal activity of *J. curcas* ethanol bark extract. A laboratory-reared mosquito larva of known age or instar was used to evaluate the larvicidal activity of *J. curcas* ethanol bark extract. These were obtained using standardized

rearing methods established by the World Health Organization (2005). *A. aegypti*'s eggs were purchased from the Research Institute for Tropical Medicine (RITM), Alabang, Muntinlupa to ensure the speciation of the larvae. The purchased eggs were then placed in a shallow pan and immersed with tap water. Larval food was added to the water after 24 hours before adding the eggs to synchronize and promote hatching. According to WHO (2005), larval food may be flakes of protein used for aquarium fish, rabbit pellets, chicken mash or powdered cat biscuits. The bacterial growth will de-oxygenate the water and this triggers egg hatching. This process usually induces the first instars to hatch within 12 hours of hydration. The shallow pan was covered using a mesh cloth with pore size not larger than an adult mosquito to prevent contamination. The reared larvae were fed at an interval of one day and observed to ensure optimal growth. The homogenous population of the late third or early fourth instars (5 days old and 4–5 mm in length) were obtained five to seven days later. The containers with reared mosquito larvae were held at  $25 \pm 2$  °C.

The study utilized 3rd to 4th instar mosquito larvae. These stages were anchored on the study of Lacey in 2012 explaining that the late 3rd to early 4th instar larvae exhibit good survival in controlled environments and provide assay consistent results. Zapata in 2015 described that these larvae can be differentiated in terms of their sizes.

Testing of the *Jatropha curcas* bark extract for larvicidal activity was carried out in the following concentrations: 1,000 ppm, 800 ppm, 400 ppm, 200 ppm, and 100 ppm. Using Petri dishes, batches of 20 third and fourth instar mosquito larvae were introduced. Any presence of water was drained and then the plate was filled with 30 ml of the extract solution. Larval mortality was recorded at 24 and 48 hours of exposure to the treatments. Larvae were considered dead if they were unrousable after probing with a needle in the siphon or cervical region (WHO, 2015).

## RESULTS AND DISCUSSIONS

Presented in this section were the results of the study which include percentage yield, pH, solubility, qualitative (Thin Layer Chromatography) measurement of the yield of alkaloid contained in *Jatropha curcas* (Tuba-Tuba) bark ethanolic extract and the result of the data gathered on the effects of the different controls, which are: 1000ppm, 800ppm, 400ppm, 200ppm, 100ppm

concentrations of the alkaloid-containing bark extract as Experimental control; Pure Malathion as Positive control; and Distilled Water as Negative control against the 3rd to 4th instar larvae of *Aedes aegypti*.

**Table 1. Results of the physicochemical properties of *Jatropha curcas* bark extract**

Solvent	% yield	Solubility	pH	Remarks
Ethanol	0.36%	Highly Soluble	6.1	1mg dissolves in 1mL water

Thin-layer chromatography also tested positive for alkaloids after spraying with Dragendorff's reagent. The retention factor obtained is 0.84 and 0.64. Table 1 revealed the result of the physicochemical properties of *J. curcas* using ethanol as its solvent. The yield was 0.3% with a pH of 6.1 and is highly soluble in water.

**Table 2. Kruskal-Wallis H test on the mortality rate of treatments for 24 hours employed.**

Treatment	$\bar{X}$ (%)	$\bar{X}$ rank	Chi-square	df	Significance
100ppm	.5556 <sup>ab</sup>	15.67	56.247	6	.000
200ppm	2.2222 <sup>abc</sup>	18.00			
400ppm	8.3333 <sup>abcd</sup>	26.33			
800ppm	68.3333 <sup>cde</sup>	41.56			
1,000ppm	93.3333 <sup>def</sup>	50.94			
Positive Control	100.0000 <sup>ef</sup>	57.50			
Negative Control	.0000 <sup>a</sup>	14.00			

Note. Means in superscript having different letters significantly differ at .05 level of significance

The Kruskal-Wallis H test showed that there was no statistically significant difference between treatment concentrations labeled with superscript 'a' which include negative control, 100ppm, 200ppm, 400ppm. There was no significant difference between concentrations labeled with superscript 'b', which include 100ppm, 200ppm, and 400ppm. Between concentrations labeled with superscript 'c', which include 200ppm, 400ppm, 800ppm, no significant difference within the group was displayed. As for the concentrations labeled with superscript 'd', which include 400ppm, 800ppm, 1000ppm, a statistically significant difference was not shown. Meanwhile, there was also no significant difference between concentrations labeled superscript 'e', which include 800ppm, 1000ppm, positive control. Lastly, there was no significant difference between the concen-

trations labeled superscript 'f' including 1,000ppm and positive control.

**Table 3. Kruskal-Wallis H test on the mortality rate of treatments for 48 hours employed**

Treatment	$\bar{X}$ (%)	$\bar{X}$ rank	Chi square	df	Significance
100ppm	2.222 <sup>2ab</sup>	13.39	58.717	6	.000
200ppm	6.1111 <sup>abc</sup>	20.00			
400ppm	21.1111 <sup>abcd</sup>	31.61			
800ppm	85.5556 <sup>cde</sup>	41.22			
1,000ppm	98.8889 <sup>def</sup>	53.28			
Positive Control	100.0000 <sup>def</sup>	55.50			
Negative Control	.0000 <sup>a</sup>	9.00			

Note. Means in superscript having different letters significantly differ at .05 level of significance.

The Kruskal-Wallis H test showed that there was no statistically significant difference between treatment concentrations labeled with superscript 'a' which include negative control, 100ppm, 200ppm, 400ppm. There was no significant difference between concentrations labeled with superscript 'b' which include 100ppm, 200ppm, 400ppm. Those concentrations labeled with superscript 'c' which include 200ppm, 400ppm, and 800ppm, displayed no significant difference with-in another. Statistically, a significant difference was also not observed between concentrations labeled with a superscript 'd' which include 400ppm, 800ppm, 1000ppm, positive control. For between concentrations labeled with superscript 'e' which include 800ppm, 1000ppm, and positive control, no significant difference within them was displayed. Lastly, concentrations labeled with superscript 'f' involving 1,000 ppm and positive have revealed no significant difference.

**Table 4. Two-Sample Independent Sample t-Test on the mortality rate of treatments across 24 and 48 hours**

Hours	N	$\bar{X}$ (%)	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
24 hours	63	38.9683	43.78428	5.51630	0.457
48 hours	63	44.8413	44.54943	5.61270	

Note. p-value = 0.05

The Two-Sample Independent Sample t-Test has shown that there was a significant difference between the mean mortality rates of the concentrations in 24 hours compared to 48 hours of contact exposure with the plant extract.

## FINDINGS OF THE STUDY

1. The ethanolic extraction had a yield of 0.36%. Water solubility tests have revealed that the ethanol extract was highly soluble and a pH value of 6.1 was obtained from the ethanol extract.
2. The Kruskal-Wallis test revealed a significant difference among concentrations in 24 and 48 hours. Post Hoc Analysis after 24 hours of contact exposure between the larvae and the extract has shown that the concentrations of 800 ppm and 1,000 ppm have larvicidal activity with no significant difference to the positive control (pure malathion). At 48 hours of contact exposure, the same concentrations plus the 400 ppm have shown no significant difference with the positive control.
3. For the experimental group, concentrations subjected against the homogenous batches of 3rd to 4th instar of *Aedes aegypti* larvae with a contact exposure of 24 and 48 hours revealed varying degrees of mortality rate. Furthermore, the Malathion as positive control displayed 100% mortality at 24 and 48 hours while the distilled water showed no larvicidal activity after the 24 and 48 hours contact exposure. The Two-Sample Independent t-Test revealed that there is no significant difference in the mean mortality rate across treatments when compared to 24 and 48-hour exposure with the *Jatropha curcas* bark ethanolic extract.

## CONCLUSION

After performing this study, the following were the conclusions:

1. The physicochemical examination of *J curcas* revealed the presence of alkaloids, the component that was theorized to cause the toxicity of the extract,
2. There existed a significant difference between *J. curcas* bark ethanol extract against mosquito larvae when compared to the positive control.
3. The study has also presented that the larvicidal activity of the extract is not time-dependent but somewhat dependent on concentration.
4. Finally, the alternative hypothesis was accepted.

## RECOMMENDATIONS

Based on the result of the study the following are the recommendations to improve the study:

1. In order to assess the maximum larvicidal potential of alkaloids present in *Jatropha curcas* bark extract against *Aedes aegypti*, it is suggested to try other extracting agents that will yield better extraction of the said phytochemical.
2. Ethyl acetate is to be avoided since the extract obtained is highly insoluble in water.
3. Since malaria is also a problem especially in rural areas, it is also suggested to use tuba-tuba extract against the *Anopheles* mosquito larvae, which serve as the carrier for the causative agent, *Plasmodium* species.
4. Explore the potential of the tuba-tuba extract to serve as an ovicidal.

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# ORGANIZATION DESIGN PREFERENCES AND CONFLICT MANAGEMENT STYLES AMONG GRADUATE STUDENTS OF NUEVA VIZCAYA STATE UNIVERSITY

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## ABSTRACT

**Good organizational design helps communications, productivity and innovation. It creates an environment where people may work effectively. Among those concerns which they may handle with utmost efficiency is conflicts management which in this study is tested for correlation with organizational design preferences among graduate education students of the College of Teacher Education, Nueva Vizcaya State University - Bambang Campus. Tools like profile, organization design preference and conflict management practice questionnaires were used to ascertain the relationship of constructs under investigation. After data analysis using descriptive method of research at 0.05 level of significance, the respondents who were generally female, less than five years in service and mostly specialized in general education displayed organizational preferences which regard leaders to possess roles and functions as authority, and conflict management styles which surfaced the emotional maturity of the respondents. Further, the preferences and styles of the respondents varied significantly when grouped according to their specialization but did not yield significant differences when grouped according to their gender and years of service. As a final point, the respondents' organization design preferences correlated significantly with their conflict management styles.**

*Keywords: Conflict Management Styles, Graduate Students, Nueva Vizcaya State University, Organizational Design Preference*

## INTRODUCTION

Many people equate organization design with an organization's structure. The words "lean" and "flat" are used to describe organization design as well as its structure. In fact, organizational design encompasses much more than simply the structure. Organization design is the process of aligning an organization's structure with its mission. This means looking at the complex relationship between tasks, workflow, responsibility and authority, and making sure these all support the objectives of the business. ([http://www. business-dictionary.com/definition/organizational-design.html](http://www.business-dictionary.com/definition/organizational-design.html))

An institution can have a great mission, great people and great leadership but still does not perform well because of poor organizational design. Without due planning, an organization's design often takes on a hierarchical structure. This structure is common because managers are often reluctant to relinquish control. However, such structures can lack flexibility, soak up resources and underuse key people and skills. When it comes to good organization design, it's a question of getting the right balance – getting the right controls, the right flexibility, the right incentives; and getting the most from people and other key resources.

More specifically, organization design is a formal, guided process for integrating the people,

information and technology of an organization. It is used to match the form of the organization as closely as possible to the purpose(s) the organization seeks to achieve. Through the design process, organizations act to improve the probability that the collective efforts of members will be successful (Autry, 1996).

Organization design begins with the creation of a strategy — a set of decision guidelines by which members will choose appropriate actions. The strategy is derived from clear, concise statements of purpose, and vision, and from the organization's basic philosophy. Strategy unifies the intent of the organization and focuses members toward actions designed to accomplish desired outcomes. The strategy encourages actions that support the purpose and discourages those that do not.

The process of organization design matches people, information, and technology to the purpose, vision, and strategy of the organization. Structure is designed to enhance communication and information flow among people. Systems are designed to encourage individual responsibility and decision making. Technology is used to enhance human capabilities to accomplish meaningful work. The end product is an integrated system of people and resources, tailored to the specific direction of the organization.

On another perspective, everyone needs to feel understood, nurtured, and supported, but the ways in which these needs are met vary widely. Differing needs for feeling comfortable and safe create some of the most severe challenges in personal and professional relationships.

Conflict situations are an important aspect of the workplace. A conflict is a situation when the interests, needs, goals or values of involved parties interfere with one another. A conflict is a common phenomenon in the workplace. Different stakeholders may have different priorities; conflicts may involve team members, departments, projects, organization and client, boss and subordinate, organization needs versus personal needs. Often, a conflict is a result of perception. Often, a conflict presents opportunities for improvement. Therefore, it is important to understand and apply various conflict resolution techniques which define conflict management practices of employees in an organization (Segal & Smith, 2014).

Conflict is a normal part of any healthy relationship. Learning how to deal with conflict—rather than avoiding it—is crucial. When conflict is mismanaged, it can cause great harm to a relationship, but when handled in a respectful, posi-

tive way, conflict provides an opportunity to strengthen the bond between and among people (Weeks, 2014). By learning skills for conflict management, personal and professional relationships can be kept strong and growing.

It is in this light that the researchers ascertained the correlation between the organization design preferences and conflict management styles involving the graduate students under the College of Teacher Education of Nueva Vizcaya State University-Bambang Campus, Bambang, Nueva Vizcaya in school year 2013-2014.

### **General Objectives of the Study**

This study aimed at identifying the preferences and styles of the graduate education students of NVSU-Bambang along organization design and conflict management correspondingly. The offshoot of which shall serve as benchmark information pertinent to educational management specifically addressing the needs of faculty members and administrators on how to manage an institution as well as how to handle conflicts that inevitably arise in any organization.

To realize such aim, this study sought to establish answers to the following specific research questions:

1. What is the profile of the graduate education (Master of Arts in Education) students of NVSU-Bambang Campus in terms of gender, years in service and specialization?
2. What are the organization design preferences of the respondents?
3. What are the conflict management styles of the respondents?
4. Are there significant differences in the organizational design preferences and conflict management styles of the respondents when grouped according to the profile variables?
5. Do the organizational design preferences of the respondents correlate significantly with their conflict management styles?

This study hence tested the hypotheses that organizational design preferences of the respondents do not correlate significantly with their conflict management styles.

### **METHODOLOGY**

The descriptive approach was used in this study which mainly determined how selected graduate (MAED) students of the College of

Teacher Education of the Nueva Vizcaya State University- Bambang Campus, perceive their organization design preferences and conflict management styles in the school year 2013-2014.

The respondents of the study were 30 graduate students who are administrators or teachers of elementary, secondary and tertiary schools in Nueva Vizcaya and its neighboring provinces like Quirino, Isabela and Ifugao among others. This number of respondents passes the stipulations of the Central Limit Theorem which assumes normal distribution with at least 30 samples.

Assessment of the respondents' organization design preferences and conflict management styles was carried out making use of a personal data sheet and questionnaires. Comparison of responses of the respondents was made possible by testing the hypothesis using the t-test or Analysis of Variance (ANOVA) while relationship of selected variables was unveiled through correlational procedures using Pearson-r.

The responses to the Organization Design Preference and Conflict Management Style Questionnaires were presented using the following scale:

Scale	Ranges	Verbal Descriptions	
		Organization Design Preference	Conflict Management Style
4	3.25-4.00	Strongly Agree	Very Likely
3	2.50-3.24	Agree	Likely
2	1.75-2.49	Disagree	Unlikely
1	1.00-1.74	Strongly Disagree	Very Unlikely

## FINDINGS

After careful handling of the data extracted from the respondents the following answers to the research questions were sought.

### Profile of the graduate education students of NVSU-Bambang Campus in terms of gender, years in service and specialization

In order to describe the respondents' profile, frequency and percentage distribution was used. Weighted means were also computed to describe some variables. Tables 1 to 3 show the information for the said variables.

**Table 1: Frequency and Percentage Distribution of Respondents along Gender**

Gender	Frequency	Percentage
Male	7	23.33
Female	23	76.67
Total	30	100.00

Majority of the respondents are female counting to 23 or a percentage of 76.67% over the male respondents with a frequency of 7 (23.33%). This suggests that the education programs of the graduate school of NVSU Bambang Campus are dominated by female students. Hence, it can also be denoted that the frequency of male-female students for the said graduate school program is 1 male student to 3 female students.

**Table 2: Frequency and Percentage Distribution of Respondents along Years in Service**

Years in Service	Frequency	Percentage
5 years or above	13	43.33
Less than 5 years	17	56.67
Total	30	100.00
Mean	4.87	

In terms of the respondents' profile on the years in service, majority of the graduate student-respondents have been serving the academe for less than 5 years slating the frequency of 17 (56.67%) while some other respondents have been in the teaching profession for more than 5 years with the frequency of 13 (43.33%).

On the average, the number of years of service for the respondents is computed as 4.87 years. This means that a typical education student of the graduate school in NVSU- Bambang Campus has been serving as a teacher for an average of 5 years.

**Table 3: Frequency and Percentage Distribution of Respondents along Specialization**

Specialization	Frequency	Percentage
English	4	13.33
Filipino	4	13.33
General Education	8	26.67
Industrial Technology	5	16.67
Mathematics	1	3.33
Science	5	16.67
Social Science	3	10.00
Total	30	100.00

As to the respondents' specialization, most of them are inclined with General Education counting to 8 respondents or a percentage share of 26.67%; some 5 graduate-student respondents (16.67%) have specialized for each educational stream along Industrial Technology and Science; a total of 4 respondents (13.33%) are majors for each language educational stream in English and Filipino; 3 (10%) of the respondents specialized in Social Science; and the remaining 1 (3.33%) respondent is inclined with Mathematics.

The findings in table 3 suggest that those who specialized in General Education are those who are teaching in the elementary level – which necessitates that teachers teach all streams of education courses based on the K-12 basic education program. Hence, other fields may suggest that distribution of teachers is diverse in terms of specialization.

### Organizational design preferences of the respondents

The respondents were asked to assess which specific organizational design they prefer. There were 16 item-indicators to describe organizational styles in a given setting. According to the respondents' perceptual evaluation, the average rate for the indicators of their preferences is computed as 3.49, which is qualitatively described as strongly agree.

This means that the respondents strongly agree to the enumerated conditions that define their preference on organizational design. As such, it may follow that these graduate student-respondents are more into organized and logical organizational structure that follows a well-defined policies and procedures in order to act considerably as a member of a given group or institution.

Ranking as the first organizational style based on the respondents' point-of-view is that rules and procedures are adhered to equal by everyone, with the mean of 3.77 qualitatively regarded as strongly agree. Following this are item-indicators that were qualified as strongly agree as well which include the following: work methods and procedures are specified (3.73); and people clear things with their boss before going over his or her head (3.67) among others.

Summarizing these responses, the respondents' organization design preference is unveiled in table 4. The preferences are categorized as mechanistic, mixed or organic designs. In a mechanistic design, employees work separately and specialize in one task; hierarchy of authority is well-defined; decision-making is kept as high as possible; there is extensive use of rules and Standard Operating Procedures; the organization is a network of positions, corresponding to tasks, typically each person corresponds to one task. On the other side, organic design is characterized by employees working together and coordinate tasks; task forces and teams are primary integrating mechanisms; authority to control tasks is delegated; face-to-face contact for coordination is used; work process tends to be unpredictable; there is

much verbal communication; informal status is based on perceived brilliance; organization is network of persons or teams; and people work in different capacities simultaneously and over time. ([http://www.analytictech.com/mb021/organic\\_vs\\_mechanistic\\_structure.htm](http://www.analytictech.com/mb021/organic_vs_mechanistic_structure.htm))

Frequencies and percentages were divulged in table 4 to show classification of the respondents' organizational preferences as to foregoing categories.

**Table 4: Summary Table on Respondents' Organization Design Preference**

Design	Frequency (f)	Percentage (%)
Mechanistic Design	1	3.33
Mixed Design	27	90.00
Organic Design	2	6.67
Total	30	100.00

The table displays that majority of the respondents prefer mixed mechanistic and organic designs (27 or 90.00%). The findings justify that among the respondents, they firmly believe that rules, procedures, and work methods should be clearly and logically defined from the top most management level down to the least authority of the organizational chart as to achieve the main objectives of the group. However, it may also suggest based on the bottom-ranks of the organizational design that those items focusing on their self-regarded strengths are less preferred by the respondents. And yet, those items that the respondents are strongly agreeing can be intensified with the least preferred design of the respondents – which goals and decisions should be from the higher ranks and/or bosses.

Giving strong fundamental bases for the findings shown in table 4, according to Autry (1996) in <http://www.inovus.com.organiza.htm>, an organization design is regarded as formal, a guided process for incorporating the people, information and expertise of an institution. Hence, it is used to go with the structure of the organization as intimately as potential to the purpose(s) the organization plans to accomplish. During the design process, organizations operate to advance the likelihood that the communal labors of members will be triumphant.

### Conflict management styles of the respondents

Pedagogical practices of the graduate student-respondents in terms of management are described by the computed mean of 3.38 being dubbed as very likely. This means that majority of the conditions considered in this study pertaining

to the management practices of the respondents during onset of conflicts are being highly favored by them. Still, this could only suggest that their emotional maturity is being utilized during conflict situations.

In the indicators of the conflict management questionnaire used in this study, 10 of the 15 items were qualified as very likely with the following as top indicators that describe the respondents' conflict management practices: trying to soothe the other person's feelings and preserve our relationship (3.63); trying not to hurt other's feelings (3.63); being usually firm in pursuing goals (3.53); and trying to be considerate of other person's wishes in negotiations (3.53) among others.

On the other hand, there are 5 items of respondents' conflict management practices that were qualified as likely. These conditions included the following: leaning toward direct discussion of the problem (3.23); attempting to get all concerns and issues immediately out in the open (3.23); feeling that differences are not always worth worrying about (3.20); trying to find a position that is immediate between the other persons' and the respondents' (3.13); and giving up some points in exchange to others (3.07).

Table 5 shows the frequency and percentage distribution of the respondents along conflict management styles based on their responses to the indicators of the conflict management questionnaire.

**Table 5: Summary Table on Respondents' Conflict Management Styles**

Styles	Frequency (f)	Percentage (%)
Competing	15	50.00
Collaborating	8	26.67
Compromising	9	30.00
Avoiding	9	30.00
Accommodating	20	66.67

Note: A single respondent may have more than one conflict management style

Conflict management styles may be categorized into the following. When one person seeks to satisfy his/her own interests regardless of the impact on other parties the conflict, he/she is *competing*. *Collaborating* is a style where the parties to conflict each desire to fully satisfy the concerns of all parties through cooperation and search for a mutually beneficial outcome. When each party to the conflict seeks to give up something, sharing occurs which defines *compromising* style. In *avoiding*, a person may recognize that a conflict exists and want to withdraw from it or suppress it.

When each party to the conflict seeks to appease an opponent, that party may be willing to place the opponent's interests above his/her own interests, the *accommodating* style is used. (Thomas, 1992)

Respondents' styles in terms of conflict management are indeed positively synching with the conditions underlying these practices. Thus, it can be deduced then that the graduate student-respondents could maintain high sense of emotional and logical maturity during process of resolving conflicts as most of them (20 or 66.67%) display the accommodating style.

### Analysis of relationship between the respondents' organization design preferences and conflict management styles

Table 6 discloses if there are significant differences in the respondents' preferences of organizational design when their views are classified along their profile variables. It showed that only in terms of their specialization that there exists significant difference, which denotes rejection of the null hypothesis on this context.

The computed f-value in terms of gender classification is 11.4605, which is lesser than the critical f-value of 2.1861 showing significant difference. This means that respondents' organizational design preferences vary significantly when they are classified in terms of their field of specialization.

**Table 6: Analysis of Difference in the Respondents' Organization Design Preferences when Grouped According to Profile Variables**

Variable	Computed Value	Critical Value
Gender	1.1165	2.0452
Years of Service	0.0001	2.0452
Specialization	11.4605*	2.1861

\*Significant (at 0.05 level of significance)

However, as stipulated in table 6, respondents' classification along gender and years of service yield no significant differences with their preferences on organizational design. For the respondents' groupings on gender profile, the computed t-value is 1.1165 with the critical t-value of 2.0452 and along with the number of years in service, the computed t-value is 0.0001 and the critical value is 2.0452. Both computed t-values are less than the corresponding critical values. Hence, the null hypotheses are accepted along these domains meaning the respondents' gender and years of service are not significant determinants of their choice of organizational design.

With regard to the procedures employed to elicit the significant difference between profile variables and conflict management practices, table 7 shows that respondents' styles in conflict management are significantly varied when viewed according to their specialization.

**Table 7: Analysis of Difference in the Respondents' Conflict Management Styles when Grouped According to Profile Variables**

Variable	Computed Value	Critical Value
Gender	1.7679	2.0452
Years of Service	1.4344	2.0452
Specialization	3.7875*	2.1925

\*Significant (at 0.05 level of significance)

As manifested in the computed f-value, respondents' view on conflict management styles along specialization is slated at 3.7875 over the critical f-value of 2.1925. This suggests that respondents' classification along their subject inclination is a significant factor to be considered in determining their conflict management styles.

On the other hand, when respondents' gender and years of service are considered in determining differences in their conflict management styles, the computed t-values 1.7679 and 1.4344 correspondingly are lesser than the critical value of 2.0452. These findings denote that the respondents' groupings in terms of gender and years of service do not show significant variations in their practices in conflict management.

#### **Analysis of relationship between the respondents' organizational design preferences and their conflict management styles**

To establish the relationship between the respondents' organizational design preferences with their conflict management styles, Pearson r was employed. Table 8 shows the results of analysis of the relationship of both constructs.

**Table 8: Analysis of Relationship between the Respondents' Organization Design Preferences and their Conflict Management Styles**

Variable	r-value	p-value
Organizational Design Preferences versus Conflict Management Styles	0.6432*	0.0001

\*Significant (at 0.05 level of significance)

After computing for the r-value of 0.6432 with the p-value of 0.0001, it showed that respondents' organizational design preferences are

significantly correlated with their conflict management styles. This justifies that respondents' preferences on organizational design are much associated with their habitual actions toward handling differences and/or arguments in the organization.

As such, when a certain education program student of the graduate school of the NVSU Bambang campus is talking about preferences for institutional design, he is more likely displaying his conflict management styles which are similar with those who have the same organization design preferences.

It is noted that majority of the respondents prefer an organizational design wherein they recognize their need to have a person who leads them and sets some standards for the organization to survive, thus substantiating their being members of the institution they are in. It is hence descriptive of the respondents that they display emotional maturity in dealing with conflicts in the organization. Both professional constructs seemingly go together as a result of the analysis of their relationship unveiled in table 8.

## **CONCLUSIONS**

After carefully handling the data to seek answers to the research questions posted earlier, the researchers came up with the following conclusions:

1. Majority of the graduate education students of NVSU-Bambang were female and had been in the teaching profession for less than five years while most of them specialized in General Education.
2. Majority of the respondents preferred an organization design which is mixed mechanistic and organic design.
3. Most of the respondents made use of the accommodating style of managing organizational conflicts.
4. There were significant differences in the respondents' organization design preferences and conflict management styles when grouped according to their specialization while no significant differences were observed when they were grouped according to their gender and years in service.
5. The respondents' organization design preferences correlated significantly with their conflict management styles.

## RECOMMENDATIONS

In light of the significant findings, the subsequent recommendations are hereby enumerated:

1. The respondents may use the findings of this study to evaluate their organizational design preferences and conflict management practices that may give them logical explanation on how they work effectively and efficiently in their own institutions as a vital member of its manpower. Thus, this study may explain the need for them to grow holistically in order to handle differences and conflicts between and among their co-workers and managers.
2. Similarly, faculty and staff of the graduate school of the College of Teacher Education may use several concepts on organizational design and conflict management practices to intensify the mission-vision goal of the college and the university as well. Hence, these concepts may also be used in strengthening existing procedures and practices focusing on organizational management and its specific components.
3. The findings may serve the Department of Education in Nueva Vizcaya as a benchmark in planning and managing priority activities that shall embody both personal and professional growth of all teachers under its umbrella. This may give NV DepEd officials idea on how to manage conflict situations within their parameters with utmost consideration and rational judgment.
4. For the teachers/professors and faculty of the graduate school, this study shall give them a bird's eye view on the organizational attitudes and conflict management behaviors of their learners, which may help in designing more innovative and scientific approaches in educational organization and management.
5. Future researchers may consider adopting the same concepts but might want to assess supervisors and administrators point-of-view and may as well consider another setting and wider research scope. They may also integrate other variables which are not included in the study, which may yield significant findings as well.

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# PROFESSIONAL CONSTRUCTS CORRELATED WITH REGISTRY OF QUALIFIED APPLICANTS (RQA) ASSESSMENT: A MATHEMATICAL MODEL

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## ABSTRACT

This descriptive study aimed at optimizing the chances of NVSU teacher education graduates to pass the yearly assessment of registry of qualified applicants (RQA). Utilizing the 303 registered qualified applicants for public elementary schools in DepEd, Nueva Vizcaya, during the academic year 2015-2016, this study specifically sought to unveil the professional constructs characterizing the applicants and their overall performance in the RQA assessment and ascertain which of the professional constructs correlated significantly with their overall performance. It was disclosed that the applicants were at their late 20's when they filed their application for a teaching position under DepEd. Their professional constructs along number of training days, demo of skill, interview skills and teaching demo skills were qualitatively described as very good while along satisfactory along PSEF experience, private teaching experience, public teaching experience and LET rating, and good along General Weighted Average, MSEF experience and English proficiency. Likewise, the applicants' overall performance in the RQA assessment was qualitatively described as good. Among the constructs significantly correlated with RQA rating of the applicants at 0.05 level were General Weighted Average, PSEF experience, MSEF experience, private teaching experience, public teaching experience, LET rating, demo of skill, interview skills, teaching demo skills and English proficiency. Finally, a mathematical model was developed to present algebraically and graphically the influence of such constructs. The results prompted preparation of prospective teachers along significantly correlated constructs which may serve as well as basis for policy making for the Department of Education to improve the performance of prospective teachers who shall be serving the elementary public schools of the division.

*Keywords: Mathematical Model, Professional Constructs, Registry of Qualified Applicants (RQA)*

## INTRODUCTION

Nueva Vizcaya State University (NVSU) is an educational institution whose campuses are nestled at the capital town and one of the growing commercial hubs of Nueva Vizcaya – Bayombong

and Bambang respectively. Undeniably, it has become the fountainhead of the teaching force in the province as the university offers programs leading to a teaching profession.

The university produces school teachers who by the very nature of their function exert tremen-

dous influence on students who will soon become nation builders. To a great extent, the quality of education depends on their ability and standards of teaching.

The teacher is the key to the learning process. A school may have the best facilities and excellent learning tools but if its teachers are inefficient and incompetent, the whole educational program would collapse. Indeed, the advancement of the constitutional aims of education depends chiefly on the teachers, Buguing (2001) asserted.

Since teachers are the direct agents for the delivery of educational services in the classroom, it is imperative for them to possess the professional and personal qualities that will make them effective catalysts of change, Basadre (2001) averred.

The biggest challenge to the Department of Education is to empower the next generation of Filipinos with an education that is comparable or even superior to those in other Asian countries, and with training that is relevant and responsive to modern agricultural, economic, and industrial needs. Nueva Vizcaya State University (NVSU) takes part of this challenge as it serves as the sculptor of future teachers.

It is for this reason that the university must strive to help equip its teacher education students with the needed and appropriate attributes that can help them to be effective, to provide best service and to produce not only highly educated, but cultured and learned human beings. Effective and efficient instructional skills are highly needed by these students in order to implement the mandate of delivering quality education that could help improve quality of life.

NVSU serves as a partner in the pre-service education training for aspiring teachers which may be modified to conform to the requirements of the program. DepEd, in coordination with the Commission on Higher Education (CHED) under which NVSU operates, shall ensure that the teacher education curriculum offered in teacher education institutions like NVSU will meet the necessary quality standards for new teachers.

Based from the DepEd Order 7, series of 2015 (March 27, 2015), there are several key indicators from which teacher applicants should pass. These indicators included education, teaching experience; Licensure Examination for Teachers (LET)/Professional Board Examination for Teachers (PBET) rating; specialized trainings; interview (skills); teaching demonstration; and communication skills thru the English Proficiency Test (EPT)

as components of the assessment of registry of qualified applicants (RQA).

It is in this light that the researchers embarked into this study to unravel professional constructs correlated with RQA assessment of elementary teacher applicants for a teaching position under DepEd and to come up with a mathematical model that may help future graduates of the teacher education program of NVSU optimize their chances of being employed in public elementary schools. The findings shall serve as well for administrators and faculty members of the College of Teacher Education to develop skills which are significant correlates of the RQA assessment.

This study followed the measures stipulated in the following conceptual framework. The factors extracted from the teacher respondents as independent variables are age, general weighted average, PSEF experience, MSEF experience, private teaching experience, public teaching experience, LET/PBET rating, training days, demo of skill, interview skills, teaching demo skills and English proficiency. These factors were tested for relationship with the dependent variable which is the RQA assessment overall rating for elementary level. The expected outcomes of this research are Mathematical model and a basis for improving competencies of elementary teacher education students aligned to RQA standards.

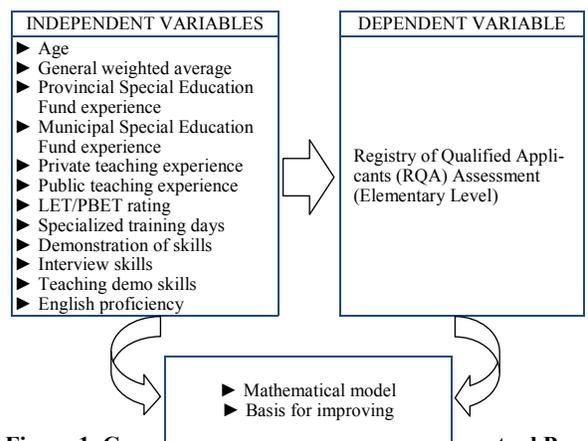


Figure 1. Conceptual Paradigm of the Study

### General Objectives of the Study

To optimize the chances of NVSU teacher education graduates to pass the RQA, the researchers were motivated to embark into this study which primarily aimed at determining professional constructs that significantly affect the

results of the RQA assessment conducted by the Department of Education particularly focusing and using the results of the assessment carried out in school year 2015-2016 for elementary teacher applicants.

Specifically, this study sought:

1. To unveil the professional constructs characterizing applicants for elementary level along age, general weighted average, PSEF teaching experience, MSEF teaching experience, public elementary teaching experience, private elementary teaching experience, LET/PBET rating, specialized trainings as to number of days, skill demonstration, interview skills, teaching demonstration skills, communication skills through the English Proficiency Test (EPT);
2. To ascertain the overall performance of the respondents in the registered qualified applicants (RQA) assessment;
3. To find out if what professional constructs influence significantly the respondents' overall performance in the RQA assessment; and
4. To come up with a mathematical model that will represent algebraically and graphically the influence of professional constructs on the respondents' overall performance in the RQA assessment.

## METHODOLOGY

This study which was carried out in the province of Nueva Vizcaya in collaboration with the Department of Education Division Office headed by Dr. Flordeliza Gecobe, Schools Division Superintendent, used the descriptive research as to elicit the general illustrations of the selected research constructs along with the components of the RQA selection guidelines and the overall performance ratings of elementary teacher applicants in particular.

Based on the total number of 423 registered qualified applicants for public elementary schools in DepEd, Nueva Vizcaya, during the academic year 2015-2016, 303 randomly selected applicants, taking 71.63% of the registered qualified applicants, were considered as samples. Such figure meets the stipulations of the Slovin's formula.

The needed data were extracted from the archive of the division office through a request to the Schools Division Superintendent (SDS). The data were organized using frequencies, percentages, means and regression analysis to develop a

mathematical model. All inferences were made using 0.05 level of significance.

The following scales were used to interpret the applicants' professional constructs:

Range and Area						Qualitative Description
PSEF, MSEF, Private and Public Teaching Experiences, Demo of Skills (10)	Interview Skill (10)	Training Days, Teaching Demo Skill (15)	English Proficiency (100)	LET rating (100)	Quality Point Index (QPI) General Weighted Average	
8.00-10.00	9.20 - 10.00	12.00-15.00	80.00-100	84.00-86.99	1.00-1.24	Very Satisfactory
6.00-7.99	8.40-9.19	9.00-11.99	60.00-79.99	81.00-83.99	1.26-1.75	Satisfactory
4.00-5.99	7.60-8.39	6.00-8.99	40.00-59.99	78.00-80.99	1.76-2.50	Good
2.00-3.99	6.80-7.59	3.00-5.99	20.00-39.99	75.00-77.99	2.51-3.00	Fair
0.00-1.99	6.00-6.79	0.00-2.99	0.00-19.99	Below 75	Below 3	Poor

To interpret applicants' overall performance in the RQA assessment, the following scale was used:

Range	Qualitative Description
77.15-83.40	Very Satisfactory
70.89-77.14	Satisfactory
64.64-70.88	Good
58.38-64.63	Fair
52.13-58.37	Poor

## FINDINGS

After thorough handling of data collected to represent the professional constructs characterizing the qualified applicants, the following results were derived.

Assessment of the Registry of Qualified Applicants (elementary level) along Selected Professional Constructs

Table 1 discloses information about the applicants for teaching positions in the Department of Education division of Nueva Vizcaya, SY 2015-2016.

**Age.** The average age of the applicants is 27.44 which could be attributed to the bulk of teacher applicants with age 20-30 having frequency of 212 or 71.95% of the total number of applicants. This shows that the applicants are the young breed of teachers who are either fresh graduates, or those who equipped themselves with further studies first, or those who gained experi-

ence yet in private institutions before finally applying for a teaching position in the public elementary schools.

**Table 1. Summary Table of Professional Constructs Characterizing the Registry of Qualified Applicants (RQA)**

Construct	Mean	Total Items	SD	Qualitative Description
Age	27.44	-	5.56	-
General Weighted Average	2.05	-	0.23	G
PSEF Experience	7.07	10	14.51	S
MSEF Experience	4.63	10	11.20	G
Private Teaching Experience	6.69	10	14.13	S
Public Teaching Experience	7.08	10	10.83	S
LET Rating	77.28	100	2.27	S
Training Days	13.28	15	14.25	VS
Demo of Skill	8.79	10	2.42	VS
Interview Skills	8.29	10	0.80	VS
Teaching Demo Skills	11.84	15	1.31	VS
English Proficiency	53.23	100	10.53	G

Legend: VS=Very Satisfactory; S=Satisfactory; G=Good

**General Weighted Average.** Using the quality point index (QPI), 87.13% or a frequency share of 264 applicants (87.13) have garnered the general weighted average in their Bachelor courses with the range of 1.76 to 2.50 with the qualitative description of good. Some 24 or a percentage distribution of 7.92% slated the average of 1.26 to 1.75 or very satisfactory; and other 15 or 4.95% of the respondents have the GWA of 2.51 – 3.00 or fair. In general the applicants’ GWA is 2.05 or qualitatively described as good.

**Provincial Special Education Fund (PSEF) Experience.** In terms of the applicants’ teaching experience as determined through Provincial Special Education Fund (PSEF), a total of 220 or a percentage share of 72.61% has no PSEF experience. Meanwhile some 58 or 19.14% have PSEF experience ranging from 1 month to 36 months while, there were 25 or 8.25% applicants showing a PSEF experience of 37 months to 72 months. On the average, along with this type of teaching experience, the applicants have 7.07 months of PSEF experience which means that the applicants are satisfactory along this domain.

**Municipal Special Education Fund (MSEF) Teaching Experience.** Similarly, majority of the teacher-applicants have no MSEF experience counting to 204 or a percentage of 67.33%. Totaling to 89 or 29.37% of the applicants may show MSEF experience of 1 month to 36 months; some

9 or 2.97% applicants showed MSEF experience from 37 months to 72 months; and 1 (0.33%) of the applicant showed the highest MSEF experience of 73 months to 108 months. However, the average months for MSEF teaching experience among the target applicants is computed as 4.63 months. In this sense, the applicants have good PSEF experience.

**Experience in Private Elementary School.** The teaching experience in private institutions was also factored in this study. Majority of these teacher applicants have no teaching experience in private schools counting to 220 or a percentage share of 72.60%. Other remaining teacher applicants have the following teaching experiences in private educational institutions: for those with 1 month to 36 months, a total of 66 or 21.78% were counted; there were 13 or 4.29% of these applicants showing 37 months to 72 months of experience; and 4 or 1.32% for those with 73 months to 108 months. For this type of teaching experience, the average scaled among the applicants is 6.69 months, which may denote that their experience in private elementary school is satisfactory.

**Experience in Public Elementary School.** Along teaching experience in public elementary schools, majority of the teacher applicants during the 2015-2016 RQA for public elementary schools in Nueva Vizcaya were recorded to be 155 in count or 51.16% of the applicants. Totaling to 139 or 45.87% of these teacher applicants do not have teaching experience in public elementary schools; 8 or 2.64% counted the experience of 37 months to 72 months; and 1 or 0.33% with 73 months to 108 months teaching experience. Among these teachers with teaching experience in the public elementary schools, the average is showed as 7.08 months which is qualitatively described as satisfactory.

According to DepEd Order No. 7, series of 2015, the following are included as teaching experience: teaching in Early Childhood (EC) Kindergarten/preschool, elementary, secondary, tertiary, higher education, Special Education (SPED), Alternative Learning System (ALS), Technical-Vocational Education and Training (TVET), learning institutions offering culture-based education programs for indigenous peoples (IP) – even prior to passing the LET.

**Rating in the Licensure Examination for Teachers (LET) or Professional Board Examination for Teachers (PBET).** In terms of the ap-

plicants' ratings for LET/PBET, majority of the applicants had scored the ratings from 75.00 to 77.99 (fair) counting to 204 or 67.33% of the teacher applicants. There were 73 or 24.09% applicants who scaled a LET/PBET rating of 78.00 to 80.99 (good); counting to 20 or 6.60% of the applicants rated at 81.00 to 83.99 (satisfactory); and another 5 or 1.65% applicants showed the highest rates at 84.00 to 86.99 (very satisfactory). There was 1 (0.33%) with no rate, which may mean that he/she might have graduated cum laude or its equivalent – giving him/her an automatic equivalent teaching eligibility. Overall, the mean rating of the teacher applicants is scaled at 75.13 which qualitatively means that the applicants have fair performance in the LET.

**Specialized Trainings in terms of Number of Days.** The typical number of days the applicants have spent for their specialized trainings is counted at 13.28 days or very satisfactory in which majority of them, having the frequency of 200 respondents or a percentage share of 66.01%, have number of days ranging from 10-19. Meanwhile, others have accumulated the following number of training days: 0-9 days with 59 respondents or a percentage distribution of 19.47%; some 16 or 5.28% of the respondents slated 20-29 training days and 30-39 days; totaling to 9 (2.97%) respondents scaled the highest number of training days at 50 and above; and few others at 3 or 0.99% of the respondents with 40-49 days.

**Demonstration of Skills.** From the total of 303 applicants, majority were rated very satisfactory for demonstration of skills with frequency of 288 or a percentage share of 95.05%; while some 15 or 4.95% were rated satisfactory. Based from the 2015 DepEd Memo for the RQA for public elementary teacher 1 position, the provision of points for the said area of evaluation shall be given 5 points or nothing, meaning, 15 of the said teacher applicants may have not demonstrated the needed competencies, or would have shown other skills than what is/are being asked for the said position.

**Interview Skills.** The applicants were also assessed along their communication skills through an interview process done by selected heads of the DepEd in the division of Nueva Vizcaya. The overall performance of the applicants along interview skills is with a mean of 8.29 which is qualified as good. This may denote that the said applicants would typically show a good level of inter-

view skills. In details, many of these teacher applicants have scored in their interview ranging from 8.40 to 9.19 points with the qualitative description of satisfactory counting to 121 or 39.99%. Some 101 or 34.98% of the respondents were rated with 7.60 to 8.39 points descriptively regarded as good; 34 or 11.22% obtaining the highest scores at 9.20 to 10.00 points and being qualified as very satisfactory in terms of the interview skills; 23 or 7.09% have obtained scores of 6.80 to 7.59 denoting that they are fair; and 19 or 6.27% were able to have the rates of 6.00 to 6.79 implying that they may have shown an interview skill below the basic proficiency.

**Teaching Demonstration Skills.** The performance of the teacher applicants along teaching demonstration skills is being generalized to be on the satisfactory level with a mean of 11.84. This may justify that teacher applicants for public elementary school teacher position in the division of Nueva Vizcaya have shown satisfactorily considerable results in their teaching demonstration activities. Many of the said teacher applicants have obtained the rates of 9.00-11.99 points (satisfactory) slating the number of 128 or 42.24%; totaling to 74 or 24.42% with the scores of being the highest at 12.00-15.00 (very satisfactory); 72 or 23.76 of the applicants showed the rates of 6.00-8.99 or good; 23 or 7.59 showing a fair teaching demonstration skills with the scores of 3.00-5.99; and few applicants with frequency of 6 or 1.98% displayed a demonstration skill below the basic proficiency.

**Communication Skills through the English Proficiency Test.** On the other hand, in terms of the respondents' communication skills along with their scores in the administered English Proficiency Test among the teacher applicants for public elementary schools obtained a mean score of 53.23. Thus, in terms of the said examination as to test their skills in using the English language, applicants are qualitatively described as good. In details, 144 or 47.52% of the applicants were able to obtain the score of 40.00-59.99 (good); a total of 96 or 31.68% were rated with 20.00-39.99 points (fair); there were 42 applicants or a percentage share of 13.86% with the rates of 60.00-79.99 (satisfactory); 12 or 3.90% obtained the lowest scores at 0.00-19.99 (poor); and for those who scored the highest at 80.00-100.00 scaled 9 or 2.97% of the teacher applicants.

### Overall Performance of the Registry of Qualified Applicants (Elementary Level)

To ascertain the overall performance of the elementary teacher applicants in the RQA assessment administered by DepEd, table 2 presents the frequency and percentage distribution of applicants as to their mean ratings.

**Table 2. Summary Assessment of Registry of Qualified Applicants**

Scale	Frequency	Percentage (%)	Qualitative Description
77.15-83.40	6	1.98	Very Satisfactory
70.89-77.14	58	19.14	Satisfactory
64.64-70.88	115	37.95	Good
58.38-64.63	96	31.68	Fair
52.13-58.37	28	9.24	Poor
Total	303	100.00	
Overall Rating	65.99 (SD=5.64)		Good

In general, table 2 gives information on the applicants' overall performance during the 2015-2016 RQA under the division of DepEd – Nueva Vizcaya. Although the descriptions provided in the specific performance of these applicants were based from the previous classifications for RQA, the average performance of the applicants is computed as 65.99 or good. However based on the corresponding DepEd Memo for the 2015-2016 RQA (specifically for the public elementary school teacher 1 position) in the division of Nueva Vizcaya, from which the passing rate is at 70% - the average rating of the said applicants then would be considered failed.

Among the 303 applicants, only 82 (27.06%) were able to obtain the passing percentage of 70%; while majority have failed the said application processes with the frequency of 221 (72.94%). This may denote that there were only less than 30% who were able to satisfy the different qualifications/indicators for a teacher 1 position for public elementary schools in Nueva Vizcaya during the 2015-2016 RQA.

Detailing the said findings in table 2, many of these applicants have recorded the percentage scores from 64.64 to 70.88 with the frequency of 115 (37.95%); a total of 96 (31.68%) accumulated the percentage of 58.38 to 64.63; there were about 58 (19.14%) with the rates from 70.89 to 77.14; totaling to 28 (9.24%) showing the percentage of 52.13 to 58.37; and 6 (1.98%) showing the highest percentage rates from 77.15 to 83.40.

The failing over all performance of the applicants may be attributed to their low performance along General Weighted Average, PSEF experi-

ence, MSEF experience, Private teaching experience, public teaching experience, LET rating and English proficiency.

### Analysis of Relationship of the Professional Constructs with the RQA Assessment

As to determine the significantly correlated professional constructs with the RQA assessment, t and p values were computed as seen in table 3.

**Table 3. Summary computed t-values and p-values in the analysis of relationship of professional constructs with RQA assessment**

Construct	Coefficient	t-value	p-value
(Constant)	13.469		
Age	-0.008	-0.542	0.588
General Weighted Average	5.609	-17.602*	0.000
PSEF Experience	0.194	37.081*	0.000
MSEF Experience	0.193	30.087*	0.000
Private Teaching Experience	0.147	28.622*	0.000
Public Teaching Experience	0.192	28.329*	0.000
LET Rating	0.277	7.319*	0.000
Training Days	0.004	0.800	0.425
Demo of Skill	0.999	32.517*	0.000
Interview Skills	0.964	10.773*	0.000
Teaching Demo Skills	1.017	18.561*	0.000
English Proficiency	0.155	20.286*	0.000

\*Significant at 0.05 level

Among the constructs significantly correlated with RQA rating of the applicants at 0.05 level were General Weighted Average, PSEF experience, MSEF experience, private teaching experience, public teaching experience, LET rating, demo of skill, interview skills, teaching demo skills and English proficiency. All computed p-values of the analysis were 0.000 along these areas which means that the null hypotheses were rejected correspondingly. This means that there is a significant relationship between these constructs and the applicants performance in the RQA assessment.

This substantiates the findings in problem 2 that the applicants posted low performance along General Weighted Average, PSEF experience, MSEF experience, Private teaching experience, public teaching experience, LET rating and English proficiency. Low performance along these constructs means low performance in their RQA assessment.

On the other hand, there were two areas which did not show significant relationship with applicants' RQA assessment, namely age and number specialized training with computed p-values of 0.588 and 0.425 respectively. These values are greater than the 0.05 level hence the hypotheses along these domains were accepted.

Hence, there are no significant relationships between these constructs and their RQA rating. Age and number of trainings therefore do not necessarily define the applicants' RQA rating.

### Algebraic and Graphical Mathematical Model Developed to Illustrate Relationship of RQA Assessment with the Selected Professional Constructs

The researchers formulated a linear mathematical model which shows the relationship between the applicants' selected professional constructs and their RQA assessment. The model is an algebraic model which can help prospective applicants estimate their RQA rating then predict their chances of landing a teacher position in the public elementary schools of Department of Education, division of Nueva Vizcaya.

The coefficients for age and number of specialized training were excluded in the linear model because they do not correlate significantly with the RQA rating of the applicants.

The algebraic model is given below:

$$\text{RQA} = 13.469 + 5.609\text{B} + 0.194\text{C} + 0.193\text{D} + 0.147\text{E} + 0.192\text{F} + 0.277\text{G} + 0.999\text{I} + 0.964\text{J} + 1.017\text{K} + 0.155\text{L}$$

Based on the analysis conducted, the constant 13.469 is computed and is placed as constant in the mathematical model. The numerical coefficients divulged in table were prefixed with respective variables representing each construct, e.g. 5.609 (General Weighted Average), 0.194 (PSEF experience), 0.193 (MSEF experience), 0.147 (private teaching experience), 0.192 (public teaching experience), 0.277 (LET Rating), 0.999 (demo of skill), 0.964 (interview skills), 1.017 (teaching demo skills), and 0.155 (English proficiency). The numerical coefficients are based on their bearing in the correlational analysis performed.

It could be seen that GWA gets the greatest weight followed by teaching demo skills and demo of skill while least effect on the RQA assessment of the applicants are private teaching experience, English proficiency and public teaching experience.

The correlation of the constructs and RQA assessment is likewise captured in the succeeding scatterplot.

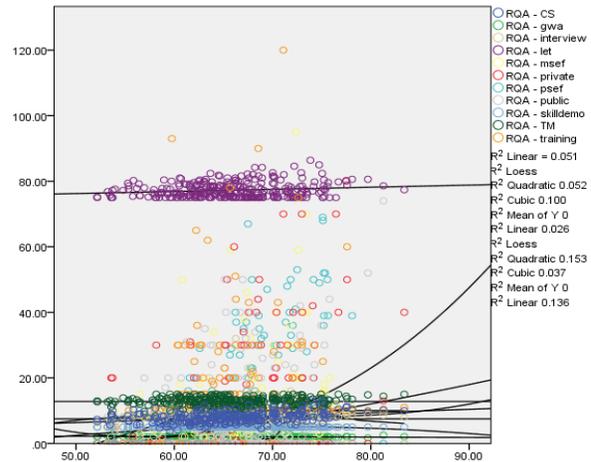


Figure 1. Scatterplot Illustrating Correlations of Selected Constructs and RQA

## CONCLUSIONS

After careful handling of the data collected to address the research questions posted in this study, the following conclusions were derived.

1. On the average, the applicants were at their late 20's when they filed their application for a teaching position under DepEd. Their professional constructs along number of training days, demo of skill, interview skills and teaching demo skills were qualitatively described as very good while along satisfactory along PSEF experience, private teaching experience, public teaching experience and LET rating, and good along General Weighted Average, MSEF experience and English proficiency.
2. Further, the applicants' overall performance during the 2015-2016 RQA under the division of DepEd – Nueva Vizcaya was qualitatively described as good. However based on the corresponding DepEd Memo for the 2015 RQA (specifically for the public elementary school teacher 1 position) in the division of Nueva Vizcaya, in which the passing rate is 70% - the average rating of the said applicants is considered failing.
3. Among the constructs significantly correlated with RQA rating of the applicants at 0.05 level were General Weighted Average, PSEF experience, MSEF experience, private teaching experience, public teaching experience, LET rating, demo of skill, interview skills, teaching demo skills and English proficiency while there were two areas which did not show significant relationship with applicants'

RQA assessment, namely age and number specialized training.

4. Lastly, a linear mathematical model was developed with the constant 13.469 while the numerical coefficients were prefixed with respective variables representing each construct, like 5.609 (General Weighted Average), 0.194 (PSEF experience), 0.193 (MSEF experience), 0.147 (private teaching experience), 0.192 (public teaching experience), 0.277 (LET Rating), 0.999 (demo of skill), 0.964 (interview skills), 1.017 (teaching demo skills), and 0.155 (English proficiency).

### RECOMMENDATIONS

With these salient findings, it is recommended that:

1. The teacher education department of NVSU may prepare prospective teachers by giving them sufficient preparation especially along their English proficiency, demonstration teaching skills, interview skills and demonstration of skills related to the teaching profession, through language training programs, intensified demonstration teaching mentoring, and career jumpstart communication skills enhancement program.
2. The findings may serve as basis for policy making for the Department of Education to improve the registry of qualified applicants who shall be serving the elementary public schools of the division.
3. Other researches may be conducted pertinent to the professional constructs investigated in this study and how they may correlate significantly with other variables like level of motivation of teachers, organizational climate, organization design preferences, conflict management skills, organizational vocabulary, and some other constructs which are deemed necessary in improving quality of work and management in the education sector.

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# INDIGENOUS STUDENTS OF NUEVA VIZCAYA STATE UNIVERSITY: THEIR 21ST CENTURY SKILLS AMIDST CHALLENGES OF 2015 ASEAN INTEGRATION AND BEYOND

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## ABSTRACT

In most countries around the world today, students are referred to as “digital natives” and today’s educators as “digital immigrant”. Teachers are working with students whose entire lives have been immersed in the 21st century media culture. The broad idea of 21st-century education revolves around the notion that schooling as we have known it for the last 150 years is a 19th century invention that must change to keep pace with the demands of 2015 ASEAN Integration. Using a descriptive method of research, this study was limited to the identification, description, and analysis of the 21st century skills of Igorot and Ifugao students of the Nueva Vizcaya State University-Bambang Campus. A total of 650 IP students were considered as respondents. Research instruments utilized were Personal Data Sheet (PDS), and 21st Century Skills Questionnaire based from P21 Framework for 21st Century Learning. In describing the data gathered, means were utilized to determine the 21st century skills of the respondents, while ANOVA I, Independent t-test, and Pearson-r were used for the inferential statistical treatment. Results showed that the IP student respondents had a “very good” level of life and career skills. Moreover, they also manifested “good” level along learning and innovation skills, and information, media, and technology skills. Using a 0.05 level of significance, gender and ethnic origin caused significant variation in their 21st century skills. Moreover, the respondents’ learning and innovation skills are significantly correlated with their information, media, and technology skills.

*Keywords: 21st century skills, ICT Skills, indigenous students, learning and innovation, life and career skills*

## INTRODUCTION

The new millennium was ushered in by a dramatic technological revolution. We now live in an increasingly diverse, globalized, and complex, media-saturated society. This technological revolution will have a greater impact on society than the transition from an oral to a print culture. Today’s kindergarteners will be retiring in the year 2067. We have no idea of what the world will look in five years, much less 60 years, yet we are charged with preparing our students for life in that world.

Our students are facing many emerging issues such as global warming, famine, poverty, health issues, a global population explosion and other environmental and social issues. These issues lead to a need for students to be able to communicate, function and create change personally, so-

cially, economically and politically on local, national and global levels (Kellner:2012).

In this information technology age, it can be hard to get a grip on the evolving roles of teachers. On one hand, it can seem as if the role of teachers has grown immensely; they are now expected to be tech-savvy, computer literate and at the cutting edge of education. On the other hand, it can seem as if technology makes the traditional role of the teacher largely obsolete. This, however, is not quite true; rather, teachers must keep their traditional devotion to students and hands-on interaction while teaching students how to navigate their 21st century world (Flamand: 2013).

As students gain access to increasing sources of information in the digital world they inhabit, teachers will be forced to keep pace. Preparing teachers to educate such students involves a wide spectrum of training. Technical skills will be a

major component, as will critical thinking and problem solving abilities. Data collection will be less important than data analysis. Teaching will have to move from the classroom to the real world albeit via a virtual one. Teachers have to be equipped with a range of skills far removed from convention. As technology advances and the learning process become increasingly information-rich, the role of a teacher will have to undergo a major change. The need to make teachers aware of the need to move from the traditional role of instructor to the role of facilitator; help them swing the focus from providing information to helping students analyze and understand the information they gather; and prepare teachers to deal with the challenges of moving from a system that is teacher-centric to student-centric. (Stewart: 2012)

The broad thinking around 21st century learning acknowledges the need for new “form and function” to be added to education goals. This thinking is informed by a belief that learning must leverage the affordances of new technologies, employ better pedagogies based on recent research on how people learn, and be cognizant of the characteristics of a new breed of learners. The indigenous students of the university are not excluded from this scenario. The one peso question is- do they possess the salient skills to match the challenges of 21st century? Are the skills they learned from the university considered as tools to cope with ASEAN economic community integration?

### **Research Objectives**

This study was limited to the identification, description, and analysis of the 21st century skills of Igorot and Ifugao students of the Nueva Vizcaya State University-Bambang Campus and its correlation with their knowledge on ASEAN 2015 integration or ASEAN economic community. Specifically, this investigation answered the following research questions:

1. What is the evaluation of the Igorot and Ifugao student respondents of their 21st Century skills in terms of the following dimensions:
  - 1.1 learning and innovation skills along:
    - 1.1.1. creativity and innovation
    - 1.1.2. critical thinking and problem solving, and
    - 1.1.3. communication and collaboration
  - 1.2 information, media and technology skills along:
    - 1.2.1. information literacy

- 1.2.2. media literacy, and
- 1.2.3. technology literacy)
- 1.3 life and career skills along:
  - 1.3.1. flexibility and adaptability
  - 1.3.2. initiative and self directions
  - 1.3.3. social and cross cultural skills
  - 1.3.4. productivity and accountability, and
  - 1.3.5. leadership and responsibility?

2. What is the respondent’s level of knowledge on ASEAN Integration 2015?
3. Are there significant differences on their perceived 21st century skills and knowledge on ASEAN 2015 Integration when they are grouped according to gender and ethnicity?
4. Are there significant correlations among the three dimensions of 21st century skills of the respondents?
5. Is there a significant correlation between the 21st century skills of the respondents and their knowledge on ASEAN Integration 2015?

With these research questions, the following null hypotheses were tested:

1. There are no significant differences on the respondents’ perceived 21st century skills and knowledge on ASEAN 2015 Integration when they are grouped according to gender and ethnicity.
2. There are no significant correlations among the three dimensions of 21st century skills of the respondents.
3. There is no significant correlation between the 21st century skills of the respondents and their knowledge on ASEAN Integration 2015?

### **METHODOLOGY**

This study employed the descriptive method of research and used a structured questionnaire as the main data-gathering tool. This method was adopted since the study intends to describe certain phenomena, and it involved fact finding or information gathering with analytical interpretation. It was conducted among the 650 IP students of the Nueva Vizcaya State University-Bambang Campus. Of the 650 respondents, 420 or 64.62 percent are male; and the rest are female, numbering to 230 or 35.38 percent. In terms of ethnicity, 43.08 percent are Ifugao (Tuwali-142, Ayangan-138); and 56.92 percent are Igorot (Kalanguya-165, Ibaloi-120, and Kankanaey-85). After obtaining official permission, the researcher personally ad-

ministered the questionnaires to the respondents. The responses were tallied and tabulated, after which they were subjected to statistical treatment for interpretation purposes in order to answer the specific questions posted in this research investigation.

## FINDINGS

### Respondents' 21st Century Skills

**Table 1. Respondent's 21<sup>st</sup> Century Skills along the Dimension of Learning and Innovation Skills**

Learning and Innovation Skills	Mean	Qualitative Description
Creativity and Innovation	3.38	Good
Critical thinking and Problem Solving	2.92	Good
Communication and Collaboration	3.27	Good
Grand Mean	3.19	Good

It can be seen in table 1 that the IP student-respondents have a good level of learning and innovation skills as shown by 3.19 computed grand mean.

The respondents' good level of creativity and innovation skills as evidenced by 3.38 computed mean could be interpreted to mean that they often act on creative ideas to make a tangible and useful contribution to the field in which the innovations will occur; they are sometimes open and responsive to new and diverse perspectives and can incorporate group input and feedback into the work; and can sometimes elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts. The respondents under investigation seldom view failure as an opportunity to learn; and understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes; and sometimes demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas.

It can be gleaned in table 1 that the IP student respondents have a "good" level of critical and thinking skills as evidenced by 2.92 computed mean that could be interpreted to mean that the respondents under study often use various types of reasoning as appropriate to the situation; often analyze how parts of a whole interact with each other to produce overall outcomes in complex systems; often analyze and evaluate evidence,

arguments, claims and beliefs, and major alternative points of view; often interpret information and draw conclusions based on the best analysis; and can often identify and ask significant questions that clarify various points of view and lead to better solutions. The same group of respondents sometimes synthesizes and makes connections between information and arguments; and often reflects critically on learning experiences and processes. However, they seldom solve different kinds of non-familiar problems in both conventional and innovative ways.

The above findings is supported by Richardson (2013) when he stressed that critical thinking skills help a person solve problems and offer creative solutions. Critical thinking also leads to reflective thinking, so each experience is an educational one. Even people who do not have strong critical thinking skills can improve those skills. It is important to increase critical thinking skills to look at problems in a logical way.

Data in the same table reflect that the IP student respondents have a "good" communication and collaboration skills as shown by 3.27 computed grand mean which could be interpreted to mean that they often listen effectively to decipher meaning, including knowledge, values, attitudes and intentions; often communicate effectively in diverse environments; often exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal; and often assume shared responsibility for collaborative work, and value the individual contributions made by each team member. The same group of respondents sometimes articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts; sometimes use communication for a range of purposes- to inform, instruct, motivate and persuade, sometimes have the ability to work effectively and respectfully with diverse teams, and seldom utilize multiple media and technologies, and know how to judge their effectiveness a priori, as well as assess their impact.

Collaboration is working together to achieve something. These two areas of human interaction share many features and help make society constructive. When communication and collaboration breaks down, violence, and even war, sometimes breaks out. If humans did not have effective communication and collaboration skills, the world would be a difficult place to live (Luger, 2013).

**Table 2. Respondent’s 21st Century Skills along the Dimension of Information, Media and Technology Skills**

Learning and Innovation Skills	Mean	Qualitative Description
Information Literacy	3.29	Good
Media Literacy	3.07	Good
Technology Literacy	3.35	Good
Grand Mean	3.24	Good

It can be gleaned in table 2 that IP student-respondents manifested a “good” level of information, media and technology skills as shown by 3.24 computed grand mean.

Results show that the respondents have a “good” information literacy as evidenced by 3.29 computed mean which could be interpreted to mean that they sometimes know how to access information efficiently and effectively; use information accurately and creatively for the issue or problem at hand; and know how to apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information. The same groups of respondents often evaluate information critically and competently; and sometimes manage the flow of information from a wide variety of sources.

It is also reflected in table 2 that the IP student-respondents have ‘good’ media literacy as shown by 3.07 computed mean. This result could be interpreted to mean that they often understand both how and why media messages are constructed, and for what purposes; always know how values and points of view are included or excluded in media and aware how media can influence beliefs and behaviors. The same respondents under investigation sometimes know how to examine how individuals interpret messages differently; how to apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media; and often understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments.

Data in table 2 show that the IP student-respondents have ‘good’ technology literacy as evidenced by 3.35 computed mean. Technology literacy is a sub-component of information, media, and technology skills which is one of the dimensions of the respondent’s 21st century skills. The findings only shows that the respondents under investigation often use technology as a tool to research, organize, evaluate and communicate information; always use digital technologies (computers, PDAs, media players, GPS, etc.) appropriately; and sometimes use communication/networking tools and social networks appropriately.

With the introduction of the K-12 curriculum in the Philippines, schools are starting to incorporate technology skills instruction in the context of information literacy skills. This is called technology information literacy. Technology is changing the way basic education institutions are offering instruction. The use of the Internet is being taught in the contexts of subject area curricula and the overall information literacy process. There is some empirical indication that teachers and students who use technology as a tool may become better at managing information, communicating, and presenting ideas.

**Table 3. Respondent’s 21st Century Skills along the Dimension of Life and Career Skills**

Learning and Innovation Skills	Mean	Qualitative Description
Flexibility and Adaptability	3.12	Good
Initiative and Self Directions	3.40	Very Good
Social and Cross Cultural Skills	4.21	Excellent
Productivity and Accountability	2.98	Good
Leadership and Responsibility	4.20	Excellent
Grand Mean	3.58	Very Good

Data in table 3 show that the IP student-respondents under study have a “very good” life and career skills as dimension of their 21st century skills as reflected by 3.58 computed grand mean.

The respondents have a “good” flexibility and adaptability skills which means that that they often adapt to varied roles, jobs responsibilities, schedules and context; often incorporate feedback effectively; and understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments. The same group of respondents perceived that they sometimes deal positively with praise, setbacks and criticism; and seldom work effectively in a climate of ambiguity and changing priorities.

According to Nielson (2013), the ability to show adaptability and flexibility is essentially a part of one’s emotional intelligence - in fact; an individual may develop this trait as they advance in leadership. Moreover, adaptability and flexibility shows that an individual can act in a way that encourages change at all times.

They are also “very good” along initiative and self directions as shown by 3.40 computed mean which could be interpreted to indicate that that the respondents often utilize time and manage workload efficiently; go beyond basic mastery of skills to explore and expand my own learning and opportunities to gain expertise; have commitment to learning as a lifelong process; and always reflect

critically on past experiences in order to inform future progress.

According to Marshall (2014), when an individual take initiative, they are creating an opportunity. The more initiative they take, the more opportunities they are creating for themselves. Initiative in a person is usually respected and rewarded. If an individual is seen as someone who is self-starting and can get things done without too much direction, this individual will be given more responsibilities and opportunities, and usually trusted by superiors because of the display of self direction.

The same group of respondents always set goals with tangible and intangible success criteria; balance tactical (short-term) and strategic (long-term) goals; define, prioritize and complete tasks without direct oversight; and sometimes have the initiative to advance skill levels towards a professional level.

It is worthy to note that the IP student-respondents under investigation have an excellent social and cross cultural skills as evidenced by 4.21 computed mean. This means that they always know when it is appropriate to listen and when to speak; always conduct themselves in a respectable, professional manner; and respond openly-mindedly to different ideas and values. Moreover, the same group of teacher-respondents perceived that they often respect cultural differences and work effectively with people from a range of social and cultural backgrounds; and can leverage social and cultural differences to create new ideas and increase both innovation and quality of work.

According to Vega and associates (2009), individuals with high level of socio-cultural skills have positive perspectives on parents and families of culturally and linguistically diverse society and are usually indulge themselves with culturally mediated instruction that is characterized by the use of culturally mediated cognition, culturally appropriate social situations for learning, and culturally valued knowledge in curriculum content.

The same table shows that the IP students have a “good” productivity and accountability skills as shown by 2.98 computed mean which is an indication that that the respondents often respect and appreciate team diversity; collaborate and cooperate effectively with teams; present themselves professionally and with proper etiquette; and always reliable, punctual, and participate actively. Moreover, the same group of respondents sometimes set and meets goals, even in the face of obstacles and competing pressure; pri-

oritize, plan and manage work to achieve the intended result; and work positively and ethically. However, the same groups of IP student-respondents always respect and appreciate team diversity; and collaborate and cooperate effectively with teams

Lastly, the IP student-respondents under study have an excellent leadership and responsibility skills as evidenced by 4.20 computed mean. The results only show that they always demonstrate integrity and ethical behavior in using influence and power; always inspire others to reach their very best via example and selflessness; and always use interpersonal and problem-solving skills to influence and guide others toward a goal.

The above findings is supported by the concept that leadership is the ability to articulate a vision, to embrace the values of that vision, and nurture an environment where everyone can reach the organizations goals and their own personal needs (Senge:2012). The same group of respondents perceived that they often leverage strengths of others to accomplish a common goal; and often act responsibly with the interests of the larger community in mind.

### **Respondents’ Level of Knowledge on ASEAN 2015 Integration**

After a thorough scrutiny of data, the IP student-respondents yielded an average knowledge level on ASEAN 2015 integration or the so-called ASEAN economic community as evidenced by 3.35 computed mean.

These IP student-respondents are aware and knowledgeable that the center of global economic gravity is shifting toward Asia. Within Asia, it is shifting toward the two giant economies of the People’s Republic of China and India. Their emergence as economic superpowers suggests that “economic size” bestows significant advantage in accelerating growth and fostering development.

They are also aware that the Association of Southeast Asian Nations (ASEAN) is in the process of creating a single market and production base, called the ASEAN Economic Community, which will allow the free flow of goods, services, investments, and skilled labor, and the free movement of capital across the region which is envisioned to be in place by 31 December 2015. The IP student-respondents strongly believe that the ASEAN Economic Community will miss its December 2015 deadline because of the challenging requirements of economic integration, including changes to domestic laws and in some cases con-

stitutional changes; and the flexibility that characterizes ASEAN cooperation, the celebrated "ASEAN way," may hand member states a convenient pretext for noncompliance. How to enforce the accords remains an issue and currently, the economic integration commitments lack sufficient mechanisms to ensure compliance.

With over 600 million people, ASEAN's potential market is larger than the European Union or North America. Next to the People's Republic of China and India, ASEAN has the world's third largest labor force that remains relatively young. However, the respondents are not fully aware that ASEAN is one of the most open economic regions in the world, with total merchandise exports of over \$1.2 trillion - nearly 54% of total ASEAN GDP and 7% of global exports. ASEAN is taking a more cautious approach to regional economic integration than Europe. In Asia, there is no serious consideration of a single currency.

The IP students are somewhat aware that ASEAN's physical infrastructure is critical to the ASEAN Economic Community's goal of establishing a single market and production base. Cross-border roads, power lines, railways and maritime development will help propel the community forward. This will boost existing and new value chains or production networks.

One of the challenges that the IP student-respondents are aware of is that the ASEAN Economic Community is bridging the perceived "development divide" between the older and economically more advanced members like Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand, known as the ASEAN-6, and the four newer members that includes Cambodia (1999), Lao People's Democratic Republic (1997), Myanmar (1997), and Viet Nam (1995). ASEAN needs a plan beyond the ASEAN Economic Community to achieve the long-term development aspirations of its 10 member countries that includes introducing structural reforms nationally and taking bold actions regionally to further deepen economic integration.

### **Significant Differences on the Perceived 21st Century Skills and Knowledge on ASEAN 2015 Integration of the Respondents when they are Grouped according to Gender and Ethnicity**

**Table 4. Summary of Differences in the 21st Century Skills of the Respondents when they are Grouped According to Gender and Ethnicity**

Variables	Degrees of Freedom	Critical Value	Computed Value	Remarks
Gender	648	1.97	2.92	Significant
Ethnicity	4 and 645	2.40	4.18	Significant

Data in table 4 show that there is a significant difference in the perceived 21st century skills of the respondents when they are grouped according to gender as shown by the computed t-value of 2.92 which is higher than the critical t-value of 1.97 at 0.05 level of confidence for 648 degrees of freedom. In this study, the male IP student-respondents have a higher level of 21st century skills compared with their female counterparts.

The same table reveals that the computed F-value of 4.18 is higher than the critical F-value of 2.40 at 0.05 level of significance for 4 and 645 degrees of freedom. Hence, the null hypothesis is rejected. There exists a significant difference on the perceived 21st century skills of the respondents when they are grouped according to ethnicity. A closer scrutiny of data reveal that the Kankanaey students have a lower level of manifesting the three dimensions of 21st century skills compared with the other group of IP students who perceived themselves to have a higher level of skills in learning and innovation, ICT, and even in their life and career skills.

**Table 5. Summary of Differences in the Knowledge on ASEAN 2015 Integration of the Respondents When They are Grouped According to Gender and Ethnicity**

Variables	Degrees of Freedom	Critical Value	Computed Value	Remarks
Gender	648	1.97	0.92	Not Significant
Ethnicity	4 and 645	2.40	1.04	Not Significant

Data in table 5 shows that the computed t-value of 0.92 is very much lower than the critical t-value of 1.97 at 0.05 level of significance for 648 degrees of freedom. Hence, the null hypothesis is accepted. There is no significant difference in the knowledge level of the respondents about ASEAN 2015 Integration when they are grouped according to gender. Whether the respondents are male or female, their knowledge about this research construct is statistically the same.

It can be seen in the same table that when the IP student-respondents were grouped according to ethnicity, their level of knowledge on ASEAN 2015 Integration is statistically the same as shown by the computed F-value of 1.04 which is lower compared with the critical F-value of 2.40 at 0.05 level of confidence for 4 and 645 degrees of freedom.

## Significant Correlations among the Three Dimensions of 21st Century Skills of the Respondents

**Table 6. Correlation Coefficient among the Dimensions of the Respondents' 21st Century Skills**

Compared Variables	Computed r-value	Remarks
A vs B	0.73 (high correlations) CD=53.29%	Very Significant
A vs C	0.38 (moderate correlations) CD=14.44%	Very Significant
B vs C	0.42 (moderate correlations) CD= 17.64 %	Very Significant

Legend: A-Learning and Innovation Skills B-Information, Media, Technology Skills C-Life and Career Skills Critical r-value at 0.05: 0.067 df: 648

It can be viewed in table 6 that the correlation coefficient between learning and innovation skills and information, media, and technology skills is 0.73 which is higher than the critical r-value of 0.067 for 648 degrees of freedom at 0.05 level of significance, indicating high correlation, with a coefficient of determination of 53.29 percent. Statistically inferred, learning and innovation skills, and information, media, and technology literacy of the respondents are very significantly related.

The above correlation suggests that technology provides more opportunities for students to collaborate with each other, so literacy will not only involve writing alone but combining ideas with others. Students will likely communicate with others across the globe, including various individuals from different nationalities and cultural backgrounds. This will require a heightened sensitivity to the ways in which other cultures respond to information. Furthermore, individuals engage in literacy practices outside of the classroom. Educators can attempt to harness these literacy activities by asking colleagues to think critically about the decisions that they make when publishing a blog or performing other forms of online written communication.

The same table shows that a moderate correlation exists between the respondents' learning and innovation skills and their life and career skills as evidenced by the computed r-value of 0.38 which is very much higher than the critical-r value of 0.067 at 0.05 level of confidence for 648 degrees of freedom, with a coefficient of determination of 14.44 percent. This finding is supported by the idea that adaptability for life and career skills demand commitment to personal and social evolution, and 21st century learning therefore incorporates methods which foster flexibility and avoid rigidity. This kind of commitment to lifelong learning is recognized as being essential to our

continued successful adaptation to the ever-accelerating changes we face as a global society.

It can be gleaned also in table 6 that a moderate correlation exists between the respondents' information, media, and technology skills and their life and career skills as indicated by the computed r-value of 0.42 which is very much higher than the critical r-value of 0.067 at 0.05 level of significance for 648 degrees of freedom, with a coefficient of determination of 17.64 percent. The said correlation is supported by the concept that learning technology is one of the dominant features of 21st century education. As computer and Internet advances open new possibilities for distance and interactive education, educators are increasingly opting to bring more high-tech learning tools into the classroom. Online tools, such as online notes, tests and assignments, allow teachers to deliver materials to students without being present. Interactive tools, such as games, models and mobile applications, allow students to learn skills while simultaneously learning course material.

### A. Correlation Between the 21st Century Skills of the Respondents and their Knowledge on ASEAN Integration 2015

**Table 7. Correlation Coefficient between the Respondents' 21st Century Skills and their Knowledge on ASEAN Integration 2015**

Compared Variables	Computed r-value	Remarks
21 <sup>st</sup> Century Skills vs ASEAN Integration 2015	0.65 (high correlations) CD=53.29%	Very Significant

Critical r-value at 0.05: 0.067 df: 648

It can be seen in table 7 that the respondents' 21st century skills have high correlations with their knowledge on ASEAN 2015 Integration as evidenced by the computed r-value of 0.65 which is very much higher than the critical r-value of 0.067 at 0.05 level of confidence for 648 degrees of freedom, with coefficient of determination of 53.29 percent.

The above correlation is an indication that these IP students need to enhance their 21st century skills to meet the challenges posted by ASEAN economic community where exchange of human resources or labor will be very evident in the future. The establishment of the ASEAN Economic Community (AEC) in 2015 is a major milestone in the regional economic integration agenda in ASEAN, offering opportunities in the form of a huge market of US\$2.6 trillion and over 622 mil-

lion people. In 2014, AEC was collectively the third largest economy in Asia and the seventh largest in the world (<http://www.asean.org>).

With these scenario, the IP students who will be future members of the labor force/market must be ready and globally fit to the standards set by the ASEAN economic community as they envision a peaceful, stable and resilient Community with enhanced capacity to respond effectively to challenges, and ASEAN as an outward-looking region within a global community of nations, while maintaining ASEAN centrality. The IP respondents should also understand that AEC envision ASEAN empowered with capabilities, to seize opportunities and address challenges in the coming decade (ASEAN Community Vision 2025) hence the need to cope with this challenges must be given priority.

## CONCLUSIONS

Based on the foregoing findings, the following conclusions were derived.

1. The respondents had a good level of learning and innovation skills, and information, media, and technology skills; and very good along the dimension of life and career skills.
2. They had an average level of knowledge on ASEAN 2015 integration.
3. Gender and ethnicity caused significant differences in their perceived 21st century skills.
4. There were no significant differences in their knowledge on ASEAN 2015 integration when they are grouped according to gender and ethnicity.
5. There were significant correlations among the three dimensions of 21st century skills of the respondents.
6. There was a significant correlation between the respondents' 21st century skills and their knowledge on ASEAN 2015 integration.

## RECOMMENDATIONS

The following hence are recommended.

1. The IP student respondents are encouraged to work in a group setting and hold discussions with peers. By listening to the opinions of others, they will learn to explore alternative perspectives and practice objective thinking salient for the enhancement of their critical and problem solving skills.

2. Since creativity begins with a foundation of knowledge, learning a discipline, and mastering a way of thinking, the IP student respondents are encouraged to be innovative and creative by experimenting, exploring, questioning assumptions, using imagination and synthesizing information.
3. University professors can foster creativity among students by promoting intrinsic motivation and problem solving skills.
4. The IP student respondents may concentrate on areas of analysis, synthesis and evaluation, as these are the core elements to critical thinking.
5. University professors may promote regular team brainstorming sessions, which allow students a chance to produce quality ideas, and create an encouraging study environment. If students see that their ideas are encouraged and accepted, they will be more likely to be creative, leading to potential innovation in the classroom.
6. The university may provide a collaborative study environment because creativity and innovation can stem from students studying together to reach a goal. The university may foster communication between students and between teachers and reward those that work together to solve problems.
7. It is highly recommended that training workshop for IP student respondents may be conducted annually in order to develop their ability to continuously adapt to, understand, evaluate and make use of the continually emerging innovations in information technology so as not to be a prisoner of prior tools and resources, and to make intelligent decisions about the adoption of new ones.
8. The curriculum may include more courses/ subjects that will develop among students the ability to understand and use the practical and conceptual tools of current information technology relevant to education and the areas of work and professional life that the students expect to inhabit as preparation for ASEAN economic community 2025.

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# CONTINUOUS IMPROVEMENT PROGRAM (CIP) IMPLEMENTATION IN RELATION TO SCHOOL PERFORMANCE

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## ABSTRACT

Education is an important basis upon which development and economic growth can be built. In fact, it is the fulcrum, around which all the nation's enterprises and endeavours revolve. The extent to which these enterprises are functional and the endeavours are worthwhile is largely dependent on the quality of education that a nation provides for its people. The aim of this study is to determine the level of implementation of Continuous Improvement Program (CIP) in relation to school performance in Guindulman, Bohol, Philippines. The method used in this study was the descriptive survey method with a modified questionnaire to gather factual information from the respondents of 120 total CI team composed of one hundred (100) teachers, and twenty (20) school heads. The gathered data were then tallied, tabulated and collated and were subjected to descriptive and inferential statistics for the purposes of analysis and interpretation in accord to the specific problems of the study. The result revealed no significant relationship between the continuous improvement program implementation and the school performance in terms of failure rate, while there is a significant relationship between the CIP implementation and the respondents' highest educational attainment. Therefore, it was concluded that the highest educational attainment of the teachers influenced the level of continuous improvement program in school. Further, the implementation of assess, plan, and act category were always observed in relation to school performance. It was recommended that the teachers should pursue educational advancement and attend relevant training/ seminar for personal growth and experience.

*Keywords: Continuous Improvement Program, Implementation, School Performance*

## INTRODUCTION

Continuous Improvement Program is a set of activities designed to bring gradual, on-going improvement to products, services and process through a constant review, measurement and action. There is widespread agreement that failure to earn a diploma is a serious problem in this country. Most people agree that the nation's dropout rate is too high and the graduation rate is unacceptably low. However, determining the full extent of the problem has been difficult due to disagreements about how to calculate the rates: it is difficult to remediate a problem when its exact nature is still in dispute. Numerous policy measures have been targeted at improving the educational attainment of young people in this country. No Child Left Behind (NCLB) placed new

emphasis on requiring that states report these rates as part of the adequate yearly progress (AYP) accountability measures. Though, the efforts at providing quality education require the inputs of various stakeholders, teachers are the prime vanguards, they are the final implementers of the curriculum. As a result, the quality of learners that an education system turns out is determined by the quality of teachers (Hallack, 1977), to a greater extent, learners' achievement is determined by the quality of teaching. Without mincing words, one can say that no nation can develop beyond the level of its teachers. The job of the teachers can never be taken for granted because of its huge responsibility, immeasurable dedication, fire burning passion and unconditional love in order to obtain learning to the learners.

## OBJECTIVES OF THE STUDY

The important aim of this study is to determine the level of implementation of Continuous Improvement Program (CIP) its impact in relation to school performance in Guindulman district during the school year 2018- 2019. Further aims to answer the following questions:

1. What is the profile of the CI Team members in terms of:
  - 1.1 Highest Educational Attainment;
  - 1.2. Number of relevant trainings/seminars attended; and
  - 1.3 numbers of CI project implemented
2. What is the level of Implementation of the Continuous Improvement Program (CIP) Processes in terms of:
  - 2.1 assess;
  - 2.2 plan; and
  - 2.3 act?
3. What is the school performance as to:
  - 3.1 failure rate; and
  - 3.2 drop-out rate?
4. Is there a significant relationship between the level of implementation of the Continuous Improvement Program (CIP) and school performance as to:
  - 4.1 failure; and
  - 4.2 drop-out?
5. Is there a significant relationship between the level of implementation of the Continuous Improvement Program (CIP) in school and the respondents' profile as to:
  - 5.1 Highest Education Attainment; and
  - 5.2 Number of Relevant Trainings Attended?

## RESEARCH METHODOLOGY

### Design

The method used in this study was the descriptive correlational method with accurate interpretation of data. It was used to gather factual information from the respondents regarding the level of implementation of continuous improvement program in relation to school performance in the district of Guindulman during the school year 2018- 2019.

### Instrument

The researchers used a modified questionnaire for the research purpose and were used as the main tool in gathering data from the respondents of the study. The questionnaire was composed of

two parts: Part I consist of the profile of the teachers including their relevant training/ seminars attended and the number of CI projects they implemented. Part II consist of fifteen (15) items on level of continuous improvement program in relation to school performance. This questionnaire was formulated from the DepEd Order No. 44, s. 2015 School Improvement Plan Guidebook.

### Environment and Participants

This study was conducted in the third congressional district of Bohol, specifically Guindulman District. These locations are situated in the eastern part of the province of Bohol and forming a district of the Department of Education.

The respondents subjected in this study were the elementary school CI team members in their respective school. A total of 120 elementary schools CI team members composed of twelve (12) males and eighty-eight (88) female- respondents, and twenty (20) school head- respondents.



Figure 1. Map of Guindulman, Bohol

### Procedure

The approval from the Dean of the College of Advanced Studies and official permit from the Supervisor of the Department of Education in the province of Bohol and the School Head of each school to conduct this study was secured. Thereat, the researcher likewise asked permission to the teachers for the purpose of this study. Questionnaires were distributed personally to the respondents and explained to them thoroughly the importance of the study and assisted in answering the questionnaires to clarify the difficult words or questions to the respondents. The said respondents were given ample time to answer the questions. It was then retrieved the answered questionnaires; while the school performance were documentarily gathered from the respective advisers of each school.

The gathered data were then tallied, tabulated and collated and were subjected to descriptive and inferential statistics for the purposes of analysis and interpretation in accord to the specific problems of the study. Thus, adding empirical data.

## THE FINDINGS

Based on the data, the following findings emerged as basis for conclusions and corresponding recommendations:

**Profile of the CI Team Members.** The respondents were composed of 20 school heads and 100 teachers and a total of 120 respondents from Guindulman District which were determined in terms of their highest educational attainment, relevant training/seminars attended and number of CI project implemented.

**Table 1. Profile of the Respondents**

1.1 Highest Educational Attainment	School Heads			Teachers		
	Frequency	Percentage (%)	Rank	Frequency	Percentage (%)	Rank
Bachelor's Degree	2	10	3	41	41	2
With Units in MA/MS	14	70	1	54	54	1
Master's Degree Holder	4	20	2	4	4	3
With Units in Ph.D/Ed.D/	0	0	4	1	1	4
Doctorate	0	0	5	0	0	5
<b>Total</b>	<b>20</b>	<b>100%</b>		<b>100</b>	<b>100%</b>	
1.2 Relevant Trainings/Seminars Attended						
Continuous Improvement Program Training-Workshop	14	24.56	2	3	2.13	4
Training-Workshop on Enhanced School Improvement Plan	11	19.30	3	30	21.28	2
In-Service Training of Teachers	20	35.09	1	100	70.92	1
Educational Management Training	5	8.77	4	1	0.71	6.5
Training on Continuous Improvement Program Coaching	2	3.51	6.5	4	2.83	3
Early Grade Reading Assessment Seminar	3	5.26	5	1	0.71	6.5
Basa Pilipinas (Read Philippines) Training-Workshop	2	3.51	6.5	2	1.42	5
<b>Total</b>	<b>57</b>	<b>100%</b>		<b>141</b>	<b>100%</b>	

Number of Continuous Improvement Project						
One	0	0	4.5	18	18	3
Two	10	50	1	39	39	1
Three	9	45	2	38	38	2
Four	1	5	3	5	5	4
Five and above	0	0	4.5	0	0	5
<b>Total</b>	<b>20</b>	<b>100%</b>		<b>100</b>	<b>100%</b>	

**Highest Educational Attainment.** Majority, 111 or almost 93% of the school heads and teacher-respondents were bachelor degree holder and with units in master's degree and only 7% were with masters' degree and with Ph.D./Ed.D. units.

**Relevant training/seminars attended.** Most of the school heads and teacher-respondents were attended the in-service training of teachers with a 60.61 %. The 20.71 % attended the training-workshop on enhanced school improvement plan. 8.58% attended the continuous improvement program training-workshop. Educational management training with 3.03 % and training on continuous improvement program coaching with also 3.03 %. And 2.02 % of the respondents attended the early grade reading assessment seminar another 2.02% attended the basa pilipinas training-workshop.

**Number of CI projects implemented.** Most of the respondents' were implemented three CI projects school heads and teacher-respondents with 40.83 %. The respondents, implemented two CI projects 39.17 %.The 15 % of them have implemented one CI projects. And the 5 % belong to those implemented four CI projects.

**Table 2. Respondents' Assessment on the Level of Implementation of the Continuous Improvement Program Processes in Schools**

Statement	School Heads			Teachers		
	WM	VI	Rank	WM	VI	Rank
<b>2.1. Assess</b>						
Identify and analyze the priority improvement areas.	3.65	AO	1	3.65	AO	1
Set objectives and target of improvement.	3.60	AO	2	3.51	AO	5
Coordinates and listen to the learners and other stakeholders.	3.55	AO	3.5	3.61	AO	2
Analyze school processes	3.40	AO	5	3.52	AO	4
Determine the root cause of the priority improvement areas	3.55	AO	3.5	3.56	AO	3
Average Weighted Mean	3.55	Always Observe		3.57	Always Observe	

<b>2.2. Plan</b>						
Review the general objectives and targets.	3.35	AO	3.5	3.54	AO	1
Formulate solutions.	3.45	AO	2	3.46	AO	4
Develop and write the project/ program design.	3.35	AO	3.5	3.42	AO	5
Prepare annual implementation plan.	3.60	AO	1	3.53	AO	2
Schedule the entire school activities.	3.40	AO	5	3.48	AO	3
Average Weighted Mean	3.43	Always Observe		3.49	Always Observe	
<b>2.3. Act</b>						
Schedule the entire school activities.	3.45	AO	2	3.49	AO	1
Gather the feedbacks from the concern clientele/ stakeholders.	3.45	AO	2	3.38	AO	4
Conduct training plan and intervention.	3.35	AO	4.5	3.33	AO	5
Have a communication plan to concerned stakeholders.	3.35	AO	4.5	3.42	AO	2
Evaluate the accomplishments and the need for improvements	3.45	AO	2	3.40	AO	3
Average Weighted Mean	3.41	Always Observe		3.40	Always Observe	
<b>Overall Weighted Mean</b>	3.46	Always Observe		3.49	Always Observe	

Legend:

Rating Scale	Verbal Interpretation
3.25 – 4.00	Always Observed (AO)
2.50 – 3.24	Often Observed (OO)
1.75 – 2.49	Sometimes Observed (SO)
1.00 – 1.74	Never Observed (NO)

Both school heads and teacher- respondents always observed the priority improvement areas in school. However, the respondents always prepare the annual implementation plan and review on the general objectives and targets. Further, the respondents always observed on the schedule the entire school activities.

**Table 3. School Performance**

3.1. Failure Rate	Frequency	Percentage (%)	Rank
0.00% - 1.00%	15	75.00	1
1.01% - 2.00%	3	15.00	2
2.01%-3.00%	1	5.00	3.5
3.01%-4.00%	0	0.00	5
5.00% and above	1	5.00	3.5
<b>Total</b>	20	100%	
3.2. Drop-Out Rate			
0.00% - 1.00%	19	95.00	1
1.01% - 2.00%	1	5.00	2
2.01%-3.00%	0	0.00	4
3.01%-4.00%	0	0.00	4
5.00% and above	0	0.00	4
<b>Total</b>	20	100%	

3.1 It was observed based on the result that there was 0.00%- 1.00% failure rate.

3.2 It was recorded based on the result that there was 0.00% - 1.00% drop-out rate.

**Table 4. Relationship Between the Level of Implementation of the Continuous Improvement Program and School Performance**

School Performance	r	Sig.	Interpretation	Decision
Failure Rate	-0.045	0.850	Not Significant	Do Not Reject Ho
Drop-Out Rate	0.340	0.142	Not Significant	Do Not Reject Ho

\*Correlation is significant at 0.05 level (2-tailed)

The result revealed that there is no significant relationship between the continuous improvement program implementation and the school performance in terms of failure rate since the computed correlation value of -0.045 with a significant value of 0.850 which is greater than 0.05 level of significance thus the researchers failed to reject the null hypothesis.

**Table 5. Relationship Between the Level of Implementation of Continuous Improvement Program Processes and Respondents' Profile**

Profile	r	Sig.	Interpretation	Decision
Highest Educational Attainment	-0.197	0.031	Significant	Reject Ho
Number of Relevant Trainings Attended	0.014	0.878	Not Significant	Do Not Reject Ho

\*Correlation is significant at 0.05 level (2-tailed)

The result revealed that there is a significant relationship between the CIP implementation and the respondents' highest educational attainment since the computed r value of -0.197 with the significant value of 0.031 which is lesser than 0.05 level of significance thus, the hypothesis is rejected.

## CONCLUSIONS

In the light of the findings presented, the following conclusions are formulated.

This determined the level of implementation of Continuous Improvement Program (CIP) in relation to school performance in Guindulman district during the school year 2018- 2019. It was found out that the level of continuous improvement program depends on the highest educational attainment of the teachers. The implementation of assess, plan, and act category are always observed in relation to school performance.

On the other hand drop-out and failure rate are not significant in relation to school performance since the school fully implemented the continuous improvement projects.

## RECOMMENDATIONS

After the thorough analysis and interpretation of this study, the following recommendations are made:

Even though the number of relevant trainings attended and the number of continuous improvement project implemented are not so essential, the teachers were encouraged to pursue educational advancement to be more knowledgeable. Second, The department of education must respond effectively to changing needs and conditions of the school through a system of educational planning, evaluation and performance to sustain CIPs. Third, future researchers may conduct similar study and make this study a reference to come up with more meaningful result.

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# MANAGING THE SPECIAL EDUCATION PROGRAM IN THE PROVINCE OF BATANGAS

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## ABSTRACT

This study is about the current status of the Special Education Program that is being catered to learners with disabilities including the gifted in the four divisions in the province of Batangas during the school year 2017-2018. It also determined the status of SPED implementation relative to curriculum management, teaching strategies, support system and monitoring and evaluation with the purpose of proposing a management guide for a more effective implementation of the SPED Program. The descriptive method of research was used in this study. The questionnaire, interview, and focus group discussion were utilized as the main data gathering instruments. The respondents of this study were 61 school heads and 159 teachers from public elementary SPED Centers/Classes in the four divisions of the province of Batangas namely Batangas Province, Batangas City, Lipa City, and Tanauan City. Special Education program implementation relative to curriculum management, teaching strategies, support system, and monitoring and evaluation was found to be moderately evident based on assessment of the two groups. The prospects in the implementation of the SPED Program includes enhancing the pre-vocational skills, strengthening support system with the LGUs, training teachers for better instructional practices, and conducting benchmarking in other SPED centers to adopt best practices. As the output of the study, a comprehensive management guide was developed to provide assistance to school heads and teachers on how to manage SPED programs more effectively. Based on the findings, the study recommended that the proposed management guide be reviewed at the division level for further modifications .

*Keywords: comprehensive management guide, curriculum management, monitoring and evaluation support system, teaching strategies*

## INTRODUCTION

Special education caters to children and adolescents with physical, mental, emotional, or behavioral problems or disabilities that prevent them from taking full advantage of regular classroom schooling. Funnell, Kulokides and Lawrence (2008) explained that the term 'disability' is broadly described as an impairment in a person's ability to function. Hence, instruction in such circumstances involves extra care, professional assistance, learning aids, and special settings and programs to help those students cope with school courses and develop skills to be able to integrate successfully in the community

Out of the 84.4 million Filipinos, approximately 5.486 million or 13 percent are considered individuals with special needs. Around 4.8 percent are provided with appropriate educational services, but the 95.2 percent of those with disabilities remain unserved. Among the 17 regions in the country, Region IV-A have the highest num-

ber of Persons with Disabilities at one hundred ninety three thousand (193,000).

Based on available data, including those gathered by the researcher herself, the four divisions in the province of Batangas, which is part of Region IV-A, has a total of 2,054 learners with disabilities in the province. There are 72 learners with visual impairment, 335 have hearing impairment, 370 are diagnosed to have autism spectrum disorder, 51 learners have behavioral problems, 76 are orthopedically handicapped or physically disabled, 115 have multiple disabilities, 30 learners have speech defects, and a total of 1,005 learners have intellectual disability.

As the Education Program Supervisor In-charge of Special Education, one of the researcher's basic functions is to monitor the different schools catering to special learners and supervise the different kinds of disabilities that are being catered in each school, what curricula are being followed for every disability, and what teaching strategies are being employed.

Based on the researcher's own observations and from the interviews she has conducted with school heads and teachers in the performance of her mandate, she found out that the teachers struggle in selecting the appropriate competencies for the learners that they are handling, except for learners with hearing impairment and with visual impairment, because the students with disabilities follow the K to 12 Curriculum, with only a few modifications. Further, the pacing of the lessons is relatively slow, which makes it difficult for them to cope with the needs of the learners. The school heads also mentioned that some parents are not as supportive and cooperative as expected in as far as the attendance of the learners in class is concerned.

These issues are compounded by the fact that for the past two years, there is no more budget allocation for the SPED programs, and the schools really experience difficulty in conducting activities involving the learners due to financial constraints. In as much as the different regional training for SPED programs are being done by cluster, like the Batangas Cluster that is composed of four divisions (Batangas Province, Batangas City, Lipa City, and Tanauan City), these somehow prove to be insufficient.

In light of these realities and pressing concerns, the researcher deemed it timely and necessary to assess the Special Education Program in the province in order to identify the status of implementation of the program, particularly in the four divisions. Specific attention is given to curriculum, teaching strategies being applied, available support system, and the monitoring and evaluation tools being used. The strengths and weaknesses in these program components of the program shall be used as bases in formulating a comprehensive management guide, which aims to enhance the implementation of the program in the four divisions of Batangas Province.

### **Statement of the Problem**

This study assessed the status of the implementation of Special Education (SPED) Program among elementary school SPED Centers/ Classes in the four divisions of Batangas Province.

Specifically, the study sought answers to the following:

1. What is the status of the Special Education program relative to children with disabilities as to:

- 1.1 program given to children with disabilities; and
- 1.2 provisions for children with disabilities?
2. How do the school heads and SPED teachers assess the implementation of Special Education program relative to:
  - 2.1 curriculum management;
  - 2.2 teaching strategies;
  - 2.3 support system; and
  - 2.4 monitoring and evaluation?
3. How do the assessments of the two groups compare? Are there significant differences?
4. What are the challenges and constraints identified in the management of the SPED program?
5. What are the prospects for the effective implementation of the SPED program?
6. What comprehensive management guide may be proposed?

### **REVIEW OF LITERATURE**

The study of Dapudong (2014) investigated international school teachers' knowledge and attitude towards inclusive education as basis for an enhanced professional development program. Two thirds of the respondents have experienced teaching students with disabilities in a formal classroom and majority of them have attended trainings or workshops in special education.

Similarly, the study recommended that in order to enhance the knowledge of teachers toward inclusive education, schools should provide more special educational needs training, sufficient learning support providers and educational resources, as well as in-depth specialization courses that provide specialized practices for implementing special education strategies in their classrooms, including offering teaching strategies on how to bridge theory and practice.

A qualitative study conducted by Yap and Adorio (2008) explored the role of the implementation of School-Based Management in promoting special education. It analyzed the impact of Special Education – Inclusive Education (SPED-IE) in the Third Elementary Education Program (TEEP) schools on the readiness of the school heads to create a highly effective learning environment. In addition, SPED-IE practices that worked well in the selected schools were identified.

In her study, Javier (2013) assessed the Special Education Program in the Division of Pasig City. She found out that the problems that were

most encountered in the program were the proliferation of untrained personnel in the identification/testing of children with special needs, inadequacy of testing materials, untrained teachers for the program, lack of support from the school administrators, and lack of incentives to the implementers.

In the same vein, Jalos (2015) investigated the status of Special Education Program in the Division of Marinduque. She focused on the reasons why the SPED Program was institutionalized, the changes and innovations made, and the type of SPED services offered. The study also covered the type of curriculum, teaching approaches, instructional material, teachers' competencies and attributes, and adequacy of support provided by administrators and parents for the Special Education program.

The study also highlighted that school administrators show support to the SPED Program by including it in the School Improvement Plan (SIP), conducting campaigns regarding SPED, allocating funds to purchase specialized and assistive technology devices and materials for teaching children with special needs, as well as funds for the renovation or construction of the SPED building.

The status of the Special Education Program in a public school was evaluated by Antonio (2007). She cited that the SPED program in a public school promotes the right of every individual to relevant quality education regardless of sex, age, breed, physical and mental condition, integrates children with special needs to the regular school system, enables children with special needs to become self-reliant and independent, and develops the maximum potentials of children with special needs. Her study also delved into the problems encountered by school administrators and SPED teachers, which included limited budget to pursue SPED programs, lack of school facilities and appropriately trained teachers, and limited number of qualified SPED teachers.

Sukys, Dumciene, and Lapeniene (2015) also explored the effects of parents' involvement in a SPED program on the academic success of students. Through a quantitative survey study, they revealed that when educators work closely with parents, their involvement increases and students benefit academically. This study was conducted among students with special needs in inclusive education classes in Lithuania. The results of their study were reported to be similar to the findings in other countries as related to students with special needs.

Similarly, Crosnoe (2009) analyzed the findings of the National Education Longitudinal Study (NELS), which indicated that when parents are involved and engaged in their child's learning, including sharing in activities within the school environment.

In relation to teachers' knowledge and skills in handling learners with special educational needs, the study of Kesiktas and Akcamete (2011) determined the degree to which the professional standards for Turkish teachers of students with visual impairments were addressed during pre-service training. They also analyzed the degree to which the in-service teachers of visual impairments implemented these professional standards. Findings of the study showed that there was insufficient knowledge and skills among teachers regarding implementation of inclusive teaching for students with visual impairments.

On the other hand, budget allocation for special education was also investigated in several studies. Bacani (2012) proved that insufficient budget was allocated to SPED schools in the Philippines. The study examined the government's dysfunction, the undesirable outcomes of its operations, and its failure to address the needs of children with special needs and of SPED schools, particularly the need for adequate funding support.

### **Hypothesis**

The study tested the null hypothesis that there are no significant differences on the assessments made by school heads and teachers regarding the management of Special Education Program

## **METHODOLOGY**

### **Research Design**

The study used the descriptive method of research to gather the needed data and information on the implementation of Special Education program in Batangas Province.

### **Respondents of the Study**

The respondents of the study were the school heads and teachers of public elementary schools with SPED Centers, as well as those from schools catering to children with exceptionalities from the four divisions in Batangas Province: Divisions of Lipa City, Tanauan City, Batangas City, and Batangas Province.

Table 1 presents the distribution of the population from the different divisions.

**Table 1. Distribution of Respondents**

Division	No. of Schools with SPED Centers/ Classes	No. of SPED Teachers	No. of Administrators
Batangas City	11	31	11
Batangas Province	45	88	45
Lipa City	4	29	4
Tanauan City	1	11	1
<b>TOTAL</b>	<b>61</b>	<b>159</b>	<b>61</b>

The table clearly shows that the Division of Batangas Province has the most number of SPED Centers/ classes with 45, and hence majority of the school heads and teacher respondents were from this division, with 45 and 88, respectively. In total, there are 61 SPED centers/ classes in the province, with 159 SPED teachers and 61 school heads or administrators.

### Data Gathering Instruments

In order to gather pertinent data to materialize this research work and achieve its objectives, a questionnaire was developed and a focus group discussion and interviews were conducted.

**Questionnaire.** The researcher-made questionnaire was the main data gathering instrument of this study.

**Construction.** The researcher used a researcher-constructed questionnaire to gather quantitative data.

**Validation.** With the permission of the adviser after the evaluation, several copies of the questionnaire were prepared for validation. Copies were presented to the experts in the field of special education and members of the defense panel for comments, suggestions and recommendations. This process served as the content validation of the instrument and was finally validated by the Dean of the CTE Graduate Program before its distribution using the link, <https://tinyurl.com/SPEDPROGRAM2018>. Another link was also created in retrieving respondents' responses.

**Scoring of responses.** The responses in the questionnaire were tallied and scored using frequency count, percentage, weighted mean, and t-test. To score the items in the questionnaire, the scale and verbal interpretations below were used.

Scale	Scale Range	Verbal Interpretation
4	3.50 - 4.00	Greatly Evident/Strongly Agree
3	2.50 - 3.49	Moderately Evident/Agree
2	1.50 - 2.49	Slightly Evident/ Disagree
1	1.00 - 1.49	Least Evident/ Strongly Disagree

**Interview.** Interviews were conducted to substantiate the quantitative data gathered from the questionnaire.

**Focus group discussion.** A group of SPED teachers were invited to serve as discussants on issues and concerns related to the implementation of the Special Education Program in their area. Guide questions taken from the statement of the problem were developed to facilitate the flow of the group discussion.

### DATA GATHERING PROCEDURE

The researcher prepared a letter of request to the Schools Division Superintendents in the Division of Batangas City, Batangas Province, Lipa City and Tanauan City for permission to conduct the study in their schools. It also aimed to seek the help of SPED teachers and school heads who would serve as the respondents of the study. Statistical Treatment of Data

After gathering the data, the researcher collated and subjected these to statistical treatment. The data collected were tabulated and analyzed using the following statistical tools: Frequency count Percentage, Weighted Mean and t-test

### FINDINGS

The following findings were obtained from data analysis and interpretation:

#### 1. Status of SPED Program Relative to Children with Disabilities

Data revealed that the Special Education program for learners with autism spectrum disorder (ASD), visual impairment, hearing impairment, learning disability, intellectual disability, cerebral palsy, and multiple disability are provided in the Divisions of Batangas Province, Batangas City and Tanauan City. The Division of Lipa City provides the same programs except classes for learning disability and cerebral palsy, which are included in the class for intellectual disability.

All four divisions in the Province of Batangas cater to learners with exceptionalities and enroll them in self-contained classes, while some are mainstreamed or inclusively enrolled in regular classes.

#### 2. Status of the Special Education Program.

The status of the Special Education Program was assessed in terms of Curriculum Manage-

ment, Teaching Strategies, Support System, and Monitoring and Evaluation.

**2.1 Curriculum Management.** School heads assessed that emphasizing moral, civic and spiritual values was the main agenda stressed in the curriculum of school SPED program. suggesting that it was moderately evident. On the other hand, implementing sensory training, special instruction in Braille reading and writing for the Visually Impaired was found to be slightly evident. It also indicates that based on the assessment of school heads, the management of curriculum for SPED program is moderately evident.

Teacher-respondents also assessed that emphasizing moral, civic and spiritual values are moderately evident, Similarly, implementing sensory training and special instruction in Braille reading and writing for the Visually Impaired had the lowest weighted mean of 2.16, which means that this is just slightly evident. positive behaviors and improvement to make learners with different exceptionalities learn. . In contrast, using graphic organizers to support the development of writing ideas got the lowest weighted mean and was moderately evident.

On the other hand, teacher-respondents considered rewarding positive behaviors and improvement as a teaching strategy to be practiced very evidently by SPED teachers. Similar to the school heads' assessment, the item assessed by the teachers to have the lowest weighted mean was the use of graphic organizers to support the development of writing ideas. It was moderately evident that SPED teachers use different strategies in teaching learners with different exceptionalities.

**2.3 Support System.** Encouraging parents of children with exceptionalities to take part in planning educational and special services for their children was assessed by the school heads as very evident. The lowest was on the government's allotment of funds for research and evaluation of special education personnel, which was found to be moderately evident. Generally, school heads assessed that the SPED program relative to support system was moderately evident.

Based on the teacher-respondents' assessment, encouraging parents of children with exceptionalities to take part in planning educational and special services for their children was moderately evident. The teachers also assessed that the government's allotment of funds for research and evaluation of special education personnel was moderately evident.

**2.4 Monitoring and Evaluation** Student Tracking System through the Learner Information System (LIS) was very evident based on the assessment of school heads. However, the provision for assistive devices was found to be moderately evident.. It also shows that SPED programs' on monitoring and evaluation were moderately evident in SPED centers as assessed by the school heads.

Teacher-respondents, on the other hand, assessed that Student Tracking System through the Learner Information System (LIS) was very evident and the provision for therapy/time out room was found to be moderately evident in SPED centers. It was revealed that the implementation of monitoring and evaluation were moderately evident in the SPED centers as assessed by the teachers.

### **3. Comparison of the Assessments on the Status of the Special Education Program**

The data indicated that the two groups of respondents did not differ significantly in their responses regarding the status of the SPED program relative to Children with Exceptionalities, Curriculum Management, Teaching Strategies, Support System, and Monitoring and Evaluation. This was revealed in the obtained p-values of 0.248, 0.119, 0.826, 0.556 and 0.405, respectively, which failed to reject the null hypotheses.

Further, results revealed that both school heads and teachers rated Intellectual Disability (ID) as the most evident exceptionality in the SPED program. Likewise, both groups of respondents considered Giftedness as the least catered among the exceptionalities in the SPED program.

As to curriculum management, both groups of respondents considered emphasizing moral, civic and spiritual values as the top priority. In terms of teaching strategies, both groups agreed that rewarding positive behaviors and improvement is the strategy most applied by teachers in handling learners with exceptionalities.

Relative to their assessments on the support system for the program, both groups assessed that encouraging parents of children with exceptionalities to take part in planning educational needs and special services for their children is the top priority. Lastly, on monitoring and evaluation, both groups agreed that the student tracking system through the Learner Information System (LIS) was the most used monitoring and evaluation tool.

#### **4. Challenges and Constraints in the Management of SPED Program**

Both groups agreed that the lack of financial support for the clinical assessment of SPED learners were the most pressing challenges and constraints in the management of the SPED Program.

On the other hand, insufficient instructional materials for children with disabilities, big class size per disability, were the least concerns in the management of the SPED program.

#### **5. Prospects in the Implementation of SPED Program**

The respondents strongly agreed on the prospects of enhancing the pre-vocational skills among ID learners, strengthening support system with the LGUs, training teachers for better instructional accommodation and modification practices, and conducting benchmarking in other SPED centers to adopt best practices.

Proposed Comprehensive Management Guide. Based on the key results of the study, a management guide was proposed to enhance the management of the SPED program in the province of Batangas. It focused on areas of concern, objectives, activities/ projects, strategies, and success indicators. Specifically, it focused on the different prospects in the implementation of SPED programs.

### **CONCLUSIONS**

The following conclusions were drawn based on the findings of the study:

1. The four divisions in the Province of Batangas have programs and provisions that cater to children with disabilities.
2. The Special Education program relative to curriculum management, teaching strategies, support system, and monitoring and evaluation was found to be moderately evident.
3. There were no significant differences in the assessments by the two groups of respondents.
4. The primary challenges and constraints identified in the management of the SPED program were lack of financial support and insufficient funds for the SPED activities.
5. The prospects in the implementation of the SPED Program included enhancing pre-vocational skills among ID learners, strengthening support system with the LGUs, training teachers for better instructional accommodation practices, and conducting benchmarking in other SPED centers to adopt best practices.

6. A comprehensive management guide was developed to provide assistance to school heads and teachers on how to manage SPED programs more effectively.

### **RECOMMENDATIONS**

Based on the conclusions drawn from the study, the following are hereby recommended:

1. The proposed management guide to enhance SPED programs may be reviewed at the division level for further modifications and enhancement prior to dissemination and implementation.
2. School heads and teachers may conduct brainstorming to tackle issues and concerns on the different constraints and challenges in the implementation of SPED programs.
3. Collaboration with stakeholders may be strengthened for possible manpower and financial support in the conduct of different SPED projects and programs.
4. A similar study such as the strengthening of inclusive education and mainstreaming of learners with disabilities in the regular school may be conducted as part of the implementation of SPED programs in a different locale.

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# FACTORS AFFECTING WOMEN'S PARTICIPATION IN POLITICAL LEADERSHIP IN SELECTED COUNTRIES OF SOUTHEAST ASIA

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## ABSTRACT

One of the most striking global trends in recent years is that there are now more women who hold executive positions such as president and prime minister than before. However, this has not translated into increased parliamentary representation considering that half of the world's population is made up of women today. This is evident despite of the fact that studies have shown that a higher number of women in parliament generally contribute to stronger attention to human development projects such as education, health care, environment and consumer protection. Therefore, this formed the need for this research. This study aimed to elaborate the factors that affect women lawmakers' decision to vie or accept positions in parliament. Findings may help contribute to formulate policies that would hasten and increase women parliamentary representation. The study used quantitative and qualitative method. Using purposive sampling, 45 women lawmakers in the parliaments of Malaysia, Philippines and Thailand participated in this research. They were chosen because of their own personal experiences in their countries' electoral systems. Based on the survey and interviews, findings showed that respondents considered demographic, economic, cultural, and political factors as well as gender-based electoral violence and mass media stereotyping influential when they decided to vie or accept appointment in legislature. The most dominant factor was political which included representation, electoral, and political party systems as well as women organizations' support, performance in previous elective/appointive public position, dedication to public service and desire to introduce change in the community and country. On the other hand, cultural factors were least important. Generally, there was no significant difference among the factors when they were compared based on nationality. Thus, women are still affected by various environmental factors decide to participate in politics. It is recommended that women be empowered by giving them due status, rights and responsibilities so they would participate actively in the parliament.

*Keywords: parliament, political leadership, political participation, political representation, women*

## INTRODUCTION

One of the most striking global trends in recent years is the growing number of women elected to the post of prime minister or president. In the western and developed countries, women political leaders have ruled like Margaret Thatcher and Teresa May in the United Kingdom and Angela Merkel in Germany. Julia Gillard and Helen Clark, on the other hand, are first female prime ministers in Australia and New Zealand respectively. In the Asia-Pacific, Tsai Ing-Wen is Taiwan's first female president while Yoriko Koike is the first female governor of Tokyo in Japan. In South Korea, Park Geun-hye was the first female president. In South Asia, Benazir Bhutto served

twice as prime minister of Pakistan. At present, Sheikh Hasina Wazed, is serving her third term as prime minister of Bangladesh. In Southeast Asia, the Philippines' elected women presidents were Cory Aquino and Gloria Macapagal - Arroyo. Indonesia's first female president, on the other hand, was Megawati Sukarnoputri while Yingluck while Shinawatra was Thailand's first female and youngest prime minister. More recently, Aung San Suu Kyi has become Myanmar's first state counselor and leader of the National League for Democracy. In Singapore, Halimah Yacob is Singapore's first female president (Song, 2016). The percentage of women ministers had also modestly increased from 14.2 per cent in 2005 to 16.7 percent in 2012. It is im-

portant to note that there are now more women who hold executive positions than before. However, this has not translated into increased parliamentary representation.

Women constitute roughly 50.0 percent of the world's population at present but no country has matched the proportion of women in the legislative branch with that of the population. This is evident despite of the fact that studies have shown that a higher number of women in parliament generally contribute to stronger attention to human development projects.

One of the most important contributors to legitimacy in a democratic state is fair and accurate representation of the citizenry, which can only be made possible by providing all citizens with the right to vote and to participate in the decision-making process (Caldwell, 2010).

Women's representation in Southeast Asia is below the global average at 18.09 percent.

According to the recent World Economic Forum 2018, Malaysia ranked 101th, the Philippines ranked 8th and Thailand ranked 73rd in the Global Gender Gap Report. With the exception of the Philippines which has achieved full parity in Political Empowerment Sub Index, Malaysia and Thailand seemed to have a long way to go. Given these dynamic conditions, findings of this study may help generate ways in which women can be more politically active and influential in Southeast Asian region.

## REVIEW OF RELATED LITERATURE

One of the most important contributors to legitimacy in a democratic state is fair and accurate representation of the citizenry, made possible by providing all citizens with the right to vote as well as participate in the decision-making process. Chant and Craske (2003) argued that the legitimacy of a state is "weakened if half of the population is under-represented," which of course is the case when women are significantly left out of political decision-making.

By democratic method, everyone is, in principle, free to compete for leadership in free election including women. This makes women's participation and representation in politics a vital component for the consolidation of democracy. Hence, women's full and equal participation is a necessary requirement, a key democracy indicator (Hunges and Kroehler, 2005).

The lack of women in office is problematic for the notion of democracy (Galligan, 2009;

Leyenaar, 2004). Specifically, the concept of representative democracy specifies that a "representative body should reflect the diversity of the electorate and MPs are elected by 'their own' constituents and accountable to them" (Leyenaar, 2004). Thus, a male-dominated legislature obviously does not reflect the gender make-up of society in general. Kirkpatrick (1974 as cited by Giraldo) claims that scholars studying gender in politics span an array of topics, but "the most important and interesting question about women's political behavior is why so few seek and wield power."

Empirical studies identified the factors affecting women's participation in political leadership. Research findings revealed that a significant correlation of women's participation in political leadership existed with that of demographic factors, economic factors, cultural factors, political factors, gender-based electoral violence and media stereotyping.

Demographic factors refer to age, civil status, level of education, previous occupation or profession and ethnicity. Age is positively related to political participation. To a certain point, the older one is, the more likely he or she will participate in politics (Verba, Schlozman, and Brady 1995). Women feel themselves to be less available to run for office during reproductive years. On the other hand, according to Adedamola, et. al. (2010), it is expected that women who are educated will be more willing and will want to participate in political leadership. Fanny and Oluwasanumi (2014) revealed that the higher the level of women's formal education is the more is their tendency to participate in politics in areas of voting in elections and occupation of political post either through elections or appointments at all levels of government. Women persistently face more household demands and family responsibility (Huang, Hammer, Neal, & Perrin, 2004; Jurik, 1998; Milkie & Peltola, 1999; Moen & Yu, 2000; Rothbard, 2001), even when working outside the home because women are still expected to be the primary caregivers. This reduces time available for work and increases stress, leading to more work-family conflict and attitudes and behaviors that interfere with business leadership (as cited by Bullough, 2008). In countries with Western style democracies, members of parliament tend to come from professional careers, rather than blue collar jobs (Norris, 1996). Ethnicity limits access to resources and opportunities and are putting women in a dependent relationship hindering their partici-

pation in the public and political spheres (Labani, Sepideh et al, 2008).

Economic factor refers to the costs of political campaign. Ziegler's (as cited by Bremond, 2017) findings showed that women who do not have well-developed fund-raising networks resulted to low women's participation in political leadership.

Cultural factors such as routes to politics, patriarchy, religion, dual burden/role and perception of public opinion have impact on women's participation in political leadership. There are three (3) distinctive pathways by which women have pursued political office. These include an elite path, a grassroots path and the middle path. Women from elite backgrounds experience fewest obstacles in attaining political office. Women vying for election to executive or legislative office come from dynastic political families. Support from family, friends, political organizations, and civic groups can help boost confidence and nurture a candidate's "inclination to consider a candidacy" (Fox & Lawless, 2005). Friends and family can play an equally influential role. In a study of state legislators, the most influential source of personal encouragement for women was their spouse or partner. Married (or living as married) female legislators were also significantly more likely to say their spouse was "very supportive" of their position in office than men (Carroll & Sanbonmatsu, 2009). Countries in which citizens are particularly religious tend to be conservative and less likely to encourage the election of women (McCulloch, 2012). Most research on gender and occupational stereotypes suggested that political office is perceived as a predominantly masculine occupation (Bligh & Kohles, as cited by Morton 2013).

Under political factors, women's representation requires institutional supporting mechanisms, which are understood to be the electoral system, political parties, and the women's organizations. Of the percentage of women elected to the lower house of parliament worldwide in 2000, women accounted for 15.4 percent of legislators in proportional systems (15.6 percent from party lists systems, 10.6 percent from single transferable vote systems), while they comprised 11.3 percent of legislators in mixed systems, and 8.5 percent in majoritarian systems (Norris, 2004). Indeed, the type of electoral system has generally been found to impact the percentage of women elected to legislatures (Kenworthy & Malami, 1999; Leyenaar, 2004; Paxton, 1997; Paxton & Kunovich, 2003; Reynolds, 1999). According to Pippa Norris (1995), barriers that inhibit women's access to politics are greatest during recruitment phase. In

general, the existing recruitment system already presents difficulties for women candidates, with party elites with prior experience in politics tending to dominate candidacy.

Gender -based electoral violence such as physical, sexual, mental and verbal violence have impact on women's participation in political leadership. Many women around the world continue to experience significant violence around election time. In 2016, an Inter-Parliamentary Union (IPU) report discovered that 44.0 percent of surveyed elected female officials experienced threats of rape, death and abductions while in office. Threats of violence and acts of violence dissuade female politicians from continuing to run for political positions and also discourages women from voting.

Media representation of leadership is an important indicator of the (un)acceptability of women leaders (Mavin et al., 2010). Press disregarded women elected officials when they first entered the political arena (Morton, 2013).

Based on the above literature and studies, women's participation in political leadership does not only represent genuine democracy but also contributes to the promotion of human development. However, there is a clear difference in women's participation in political leadership across the world. In Southeast Asia, there is a disparity of women representation in national legislatures of Malaysia, Philippines and Thailand. Thus, this study aimed to further elaborate the research on the extent of influence of factors affecting women's decision to vie or run or accept appointment for legislature to help fill the gap on women political representation literature and contribute more on the empowerment of women as a manifestation of genuine democracy and total human development.

## STATEMENT OF THE PROBLEM

This study aimed to elaborate the extent of influence of factors affecting women's participation in political leadership in selected countries of Southeast Asia.

Specifically, the following questions were sought to be answered:

1. How did the following factors affect women's participation in political leadership in Malaysia, Philippines and Thailand:
  - 1.1 demographic factors;
  - 1.2 economic factor;
  - 1.3 cultural factors;

- 1.4 political factors;
  - 1.5 gender-based electoral violence; and
  - 1.6 mass media?
2. What was the most dominant factor affecting women's participation in political leadership in Malaysia, Philippines and Thailand?
  3. What was the least factor affecting women's participation in political leadership in Malaysia, Philippines and Thailand?
  4. How did the factors affecting women's participation in political leadership compare in Malaysia, Philippines and Thailand?

## METHODOLOGY

The quantitative and qualitative methods using survey and interview were used in this study. For quantitative research, the researcher used a close-ended questionnaire while face-to-face interview for qualitative to gather and compile first hand, personal in-depth accounts of women lawmakers about their experiences when they decided to run or accept appointments in the legislature. Participants belonged to the 17th Congress of the Philippines (2016-2019), 14th Parliament of Malaysia (2018-2022) and Thailand's National Legislative Assembly whose members were appointed by the military junta since 2014 until the general elections 2019. Data were obtained through emails, personal visit to the offices of women lawmakers and interviews. There were 45 women lawmakers who participated in this study. To establish the efficiency and effectiveness in analyzing the data in this research, frequency, percentage, weighted mean, standard deviation and Analysis of Variance (ANOVA) were used.

## FINDINGS

1. Assessment of Factors Affecting Women's Participation in Political Leadership in Malaysia, Philippines, and Thailand

**Table 1.1 Factors Affecting Respondents' Participation in Political Leadership in Malaysia, Philippines and Thailand**

FACTORS	Malaysia N - 9			Philippines N - 28		
	Mean	S.D.	V.I.	Mean	S.D.	V.I.
Demographic Factors						
Age	2.67	1.41	MI	2.64	1.25	MI
Level of Education	4.22	0.83	I	3.54	1.14	I
Civil Status	3.11	1.62	MI	1.61	0.99	SI
Ethnicity	3.00	1.32	MI	1.96	1.26	SI
Previous occupation/profession	3.56	1.33	I	2.89	1.34	MI
Overall	3.31	1.07	MI	2.54	0.86	MI

	Malaysia N - 9			Philippines N - 28		
	Mean	S.D.	V.I.	Mean	S.D.	V.I.
Demographic Factors						
Economic Factor						
Financial / campaign resources	4.00	1.22	I	4.00	0.90	I
Overall	4.00	1.22	I	4.00	0.90	I
Cultural Factors						
Political prominence of the family in the community	2.56	1.42	M.I.	3.00	1.22	M.I.
Having a husband - politician.	1.22	0.44	N.I.	2.11	1.26	S.I.
Encouragement of relatives and friends	4.67	0.71	V.I.	3.75	1.04	I
Dual role as wife/mother and elected/appointed official	3.00	2.00	M.I.	3.46	1.23	M.I.
Belief that politics is a career for women	4.22	1.30	I	3.57	1.23	I
Belief that politics is a man's world.	1.33	0.71	N.I.	1.43	0.84	N.I.
Religion beliefs.	3.00	1.41	M.I.	2.32	1.25	S.I.
Peoples' perception that women should be responsible for the family only	1.67	1.00	S.I.	1.61	1.07	S.I.
Peoples' perception that women do not have enough experience to occupy elective/appointive position.	2.11	1.27	S.I.	1.61	1.13	S.I.
Overall Mean	2.64	0.54	M.I.	2.55	0.61	M.I.
Political Factors						
Existing electoral system	4.67	.50	VI	3.90	0.77	I
Political party support	4.89	.33	VI	3.90	1.05	I
Women organizations' support	4.67	.71	VI	4.10	0.86	I
Performance in previous elective/appointive public position	4.00	1.20	I	4.10	1.24	I
Dedication to public service	5.00	.00	V.I.	4.93	0.26	VI
Desire to introduce change in the community and country	5.00	.00	V.I.	4.86	0.35	V.I.
Overall Mean	4.71	.30	V.I.	4.30	0.49	I
Gender-based Electoral Violence						
Emotional violence	3.56	1.13	I	3.34	1.32	M.I.
Physical violence	3.78	0.97	I	3.45	1.27	M.I.
Sexual violence	3.56	1.33	I	3.45	1.35	M.I.
Verbal violence	3.89	1.05	I	3.55	1.27	M.I.
Overall Mean	3.69	1.04	I	3.45	1.27	M.I.
Media						
Mass media undermine the role of women in society	3.33	1.12	M.I.	3.07	1.46	M.I.
Male and female candidates do not have equal access to mass media during election.	2.56	1.33	M.I.	2.83	1.37	M.I.
Mass media play a major role in influencing women's participation in politics.	4.11	0.93	I	3.55	1.18	M.I.
Overall Mean	3.33	0.82	M.I.	3.15	1.13	M.I.

FACTORS	Thailand N- 7			Overall N – 44		
	Mean	S.D.	V.I.	Mean	S.D.	V.I.
Demographic Factors						
Age	3.29	1.70	MI	2.75	1.35	MI
Level of Education	3.86	0.69	I	3.73	1.04	I
Civil Status	3.00	1.29	MI	2.14	1.36	SI
Ethnicity	2.86	1.46	MI	2.32	1.36	SI
Previous occupation/ profession	3.33	1.21	MI	3.09	1.32	MI
Overall	3.26	1.10	MI	2.81	0.99	MI
Economic Factor						
Financial / campaign re- sources	3.86	0.38	I	3.98	0.90	I
Overall	3.86	0.38	I	3.98	0.90	I
Cultural Factors						
Political prominence of the family in the community	3.71	1.25	I	3.02	1.28	M.I.
Having a husband - politi- cian.	3.71	1.38	I	2.18	1.37	S.I.
Encouragement of relatives and friends	4.00	1.15	I	3.98	1.05	I
Dual role as wife/mother and elected/appointed official	3.50	1.05	I	3.37	1.38	M.I.
Belief that politics is a career for women	3.57	0.98	I	3.71	1.21	I
Belief that politics is a man's world.	2.83	1.17	M.I.	1.60	0.98	SI
Religion beliefs.	3.00	1.15	M.I.	2.57	1.28	MI
Peoples' perception that women should be responsible for the family only	3.43	1.27	M.I.	1.91	1.25	S.I.
Peoples' perception that women do not have enough experience to occupy elec- tive/appointive position.	3.17	1.47	M.I.	1.93	1.30	S.I.
Overall Mean	3.19	1.15	M.I.	2.67	0.73	M.I.
Political Factors						
Existing electoral system	4.50	0.71	V.I.	4.10	0.78	I
Political party support	4.50	0.71	V.I.	4.15	1.00	I
Women organizations' sup- port	4.50	0.71	V.I.	4.25	0.84	I
Performance in previous elective/appointive public position	4.00	0.00	I	4.08	1.18	I
Dedication to public service	4.50	0.71	V.I.	4.93	0.27	V.I.
Desire to introduce change in the community and country	4.50	0.71	V.I.	4.88	0.34	V.I.
Overall Mean	4.42	0.59	I	4.40	0.48	I
Gender-based Electoral Vio- lence						
Emotional violence	4.00	0.00	I	3.43	1.24	M.I.
Physical violence	3.50	0.71	I	3.53	1.18	I
Sexual violence	3.50	0.71	I	3.48	1.30	M.I.
Verbal violence	4.00	0.00	I	3.65	1.19	I
Overall Mean	3.75	0.35	I	3.52	1.18	I
Media						
Mass media undermine the role of women in society	4.50	0.71	V.I.	3.20	1.38	M.I.
Male and female candidates do not have equal access to mass media during election.	4.50	0.71	V.I.	2.85	1.37	M.I.
Mass media play a major role in influencing women's par- ticipation in politics.	4.50	0.71	V.I.	3.73	1.13	I
Overall Mean	4.50	0.71	V.I.	3.26	1.07	MI

N – Number of cases

S.D.- Standard Deviation

Verbal Interpretation: 4.50 – 5.00 Very Important (VI);

3.50 – 4.49 Important (I);

2.50 – 3.49 Moderately Important (MI);

1.50 – 2.49 Slightly Important (SI);

1.00 – 1.49 Not Important (NI)

**1.1 Demographic factors** were Moderately Important (MI) affecting respondents' participation in political leadership in Malaysia, Philippines and Thailand with overall mean of 2.81. It was level of education that obtained the highest rating with verbal interpretation of Important (I) with 3.73 mean. This is so because twenty-six (26) out of the 44 of the respondents or 58.0 percent were post-university graduates while 16 respondents acquired university education or 36.0 percent. Their degrees included business, law, education, medicine and engineering. This concurs with the study of Fanny and Oluwasanmi, (2014) that the higher the level of women's formal education, the more their tendency to participate in politics such as voting and occupation in political posts in government. Based on the interview, high educational attainment increased respondents' self – confidence to feel competitive in elective position and to gain electoral support. On the other hand, civil status was Slightly Important (SI) with mean of 2.14. The overall average age of the respondents is 57.1 years, which means that they were already beyond child-bearing/reproductive age. The children were no longer dependent to them. Feminist – liberalism identified the various challenges to women in social aspects such as civil status which discourage women to be fully participating in political processes.

**1.2 Respondents** considered financial or campaign resources for elections Important (I) with mean of 3.98. This was similar with the findings on 2015 World Bank's global survey that female politicians identified financing campaign as an obstacle when vying or running for parliament (World bank, 2015). According to Burns, Schlozman, and Verba (2001), women tend to have fewer resources than men which result to lack of courage to run for political representation. Respondents considered not having adequate financial or campaign resources which almost discouraged them to vie for seats in parliament.

**1.3 Overall**, cultural factors obtained a mean score of 2.67 for women-lawmakers in Malaysia, Philippines and Thailand. This was equivalent to verbal interpretation of Moderately Important (MI). Encouragement of their relatives and friends influenced the respondents the most as to

decide whether to vie or run for parliament. This factor acquired an overall mean of 3.98. This result is similar to the results of a global survey among women legislators that female politicians with supportive families run for office (World Bank, 2015). On the other hand, the least important was belief that politics is a man's world with mean of 1.60 or verbal interpretation of Slightly Important (SI). This finding is contrary to most research on gender and occupational stereotypes which suggests that political office is perceived as a predominantly masculine occupation (Bligh and Kohles, as cited by Morton 2013). This attitude can be attributed to women's change in outlook, evolution of the legal environment and education and economic emancipation of women (Pintat,1998). Malaysia had its first election in 1955 while Philippines in 1937 and Thailand in 1932 allowing women to vote and be voted upon. Since then, the presence of elected women in parliament has encouraged more women to take a greater political role.

**1.4** Respondents considered political factors as Important (I) which obtained a mean score of 4.40. The highest important factor was dedication to public service with overall mean of 4.93 with verbal interpretation of Very Important(VI). All respondents expressed a motivation for entering politics that could be characterized as civic-inspired, that is they wanted to help the constituency, society or country in general. Several legislators that were interviewed entered political life through civic and volunteer activities, usually motivated by a sense of civic-duty and a desire to make their constituency a better place. On the other hand, the type of existing electoral system was the least important with mean of 4.10 with verbal interpretation of Important.

**1.5** Overall, gender-based electoral violence obtained a mean of 3.52 with verbal interpretation of Important (I). Verbal violence obtained the highest form of gender – based electoral violence with 3.65 mean score while emotional violence with mean of 3.43 obtained verbal interpretation of Moderately Important. Gender-based electoral violence is still prevalent. Verbal violence discouraged women and they had difficulty addressing biased attitudes.

**1.6** As a whole, mass media obtained a mean of 3.26 with verbal interpretation of Moderately Important (MI). Respondents believed that mass media play a major role in influencing women's participation in politics. This factor obtained a mean of 3.73 with Important (I) verbal interpretation. However, they did not consider the unequal

access to media of male and female candidates as significant when they vied or ran in parliament.

2. Assessment on Most Dominant Factors Affecting Women's Participation in Political Leadership in Malaysia, Philippines and Thailand

**Table 2. Dominant Factors Affecting Respondents' Participation in Political Leadership in Malaysia, Philippines and Thailand**

Factors Affecting Women's Participation in Political Leadership	Malaysia			Philippines		
	Mean N = 9	S.D.	V.I.	Mean N = 29	S.D.	V.I.
Demographic factors	3.31	1.07	M.I.	2.54	0.86	M.I.
Economic factor	4.00	1.22	I	4.00	0.90	I
Cultural factors	2.64	0.54	M.I.	2.55	0.61	M.I.
Political factors	4.71	0.30	V.I.	4.30	0.49	I
Gender-based electoral violence	3.69	1.04	I	3.45	1.27	M.I.
Mass Media	3.33	0.82	M.I.	3.15	1.13	M.I.

Factors Affecting Women's Participation in Political Leadership	Thailand			Overall		
	Mean N = 7	S.D.	V.I.	Mean N = 45	S.D.	V.I.
Demographic factors	3.26	1.10	M.I.	2.81	0.99	M.I.
Economic factor	3.86	0.38	I	3.98	0.90	I
Cultural factors	3.19	1.15	M.I.	2.67	0.73	M.I.
Political factors	4.42	0.59	I	4.40	0.48	I
Gender-based electoral violence	3.75	0.35	I	3.52	1.18	I
Mass Media	4.50	0.71	V.I.	3.26	1.07	M.I.

Overall findings showed that political factors were the most influential to respondents when they vied for seats in the parliaments of Malaysia, Philippines and Thailand with a total mean of 4.40. This had verbal interpretation of Important (I). These factors were electoral system, internal political party support, women's organization, previous elective /appointive posts, dedication to public service and desire to introduce change in the community and country. Based on the interviews, the opportunity for the respondents to be proposed as candidates depended on their financial resources, internal policy of their political parties and women organizations' support. Strategic alliances were also necessary to secure their win in elections.

3. Assessment on Least Important Factors Affecting Women's Participation in Political Leadership in Malaysia, Philippines and Thailand

Cultural factors were Moderately Important (I) factors, affecting respondents' decision to run

or vie or accept appointment in public office with an overall mean of 2.67. These factors included political prominence of the family in the community, having a husband-politician, encouragement of relatives and friends, dual role as wife/mother and being elected /appointed official, political and religious beliefs as well as perception on public opinion about political qualification, knowledge, and efficacy of women, affecting their decisions to vie or run or accept appointment in the legislature. Respondents said that the evolution of the legal environment such as the granting of women's suffrage and compulsory representation through party-list contributed to remove the barriers for their parliamentary representation.

#### 4. Comparison of Factors Affecting Respondents' Participation in Political Leadership in the Philippines, Malaysia and Thailand

**Table 3 Comparison of Factors Affecting Women's Participation in Political Leadership in the Philippines, Malaysia and Thailand**

Factors	Countries	Mean	S.D.	F-value	p-value	Sig	Remarks (Post Hoc)
Demographic	Malaysia	3.31	1.07	3.29	P = 0.047 < 0.05	S	Malaysia VS Philippines
	Philippines	2.54	0.86				
	Thailand	3.26	1.10				
	Total	2.81	0.99				
Economic	Malaysia	4.00	1.22	0.07	P = 0.932 > 0.05	NS	
	Philippines	4.00	0.90				
	Thailand	3.86	0.38				
	Total	3.98	0.90				
Cultural	Malaysia	2.64	0.54	2.31	P = 0.112 > 0.05	NS	
	Philippines	2.55	0.61				
	Thailand	3.19	1.15				
	Total	2.67	0.73				
Political	Malaysia	4.71	0.30	2.73	P = 0.078 > 0.05	NS	
	Philippines	4.30	0.49				
	Thailand	4.42	0.59				
	Total	4.40	0.48				
Gender-based Electoral Violence	Malaysia	3.69	1.04	0.18	P = 0.835 > 0.05	NS	
	Philippines	3.45	1.27				
	Thailand	3.75	0.35				
	Total	3.52	1.18				
Mass Media	Malaysia	3.33	0.82	1.56	P = 0.224 > 0.05	NS	
	Philippines	3.15	1.13				
	Thailand	4.50	0.71				
	Total	3.26	1.07				
	Philippines	2.78	0.51				
	Thailand	2.72	0.70				
Total	2.82	0.52					

There is a significant difference ( $P = 0.047 < 0.05$ ) between Malaysia and Philippines in the demographic factors affecting respondents' deci-

sion to run or vie for public office. Malaysian respondents were highly affected by civil status and ethnicity when they decided to vie or run for parliament. On the other hand, there is no significant difference among the mean scores of other factors such as economic, cultural, political, gender-based electoral violence and mass media.

Based on the survey and interview, the results showed that women lawmakers were affected by demographic, economic, cultural, political, gender-based electoral violence and mass media stereotyping factors when they decided to vie or run or accept appointment for seats in parliament.

## CONCLUSIONS

Based on the findings, the researcher hereby concludes the following:

1. Demographic, economic, cultural, political, gender-based electoral violence and mass media stereotyping were influential when respondents decided to vie or run or accepted positions in their parliaments.
2. Political factors which included political representation system, electoral system, internal process in political party system, women organizations' support, performance in previous elective/appointive public position, dedication to public service and desire to introduce change in the community and country were most influential when respondents decided to run for parliament.
3. Cultural factors which included political prominence of the family in the community, having a husband politician, encouragement of relatives and friends, dual role as wife/mother and elected/appointed official, belief that politics is a career for women, belief that politics is a man's world, religious beliefs, people's perception that women should be responsible for family only and people's perception that women do not have enough experience to occupy elective or appointive position, were considered least influential for respondents when they decided to run or vie or accept seats in parliament.
4. There was no significant difference among the factors that affected respondents' decision to vie or run or accept positions in the legislature. However, there was a significant difference between Malaysia and Philippines in the demographic factors affecting respondents' decision to run or vie for public office.

## RECOMMENDATIONS

Based on the findings and conclusions, the following are hereby recommended:

1. Women should be empowered by giving them due status, rights and responsibilities so that they would not be influenced by various factors such as demographic, economic, cultural, political, gender-based electoral violence and mass media stereotyping.
2. Governments should consider electoral reforms such as quota system and proportional representation to enable women to be politically participative in the legislature.
3. Cultural factors must be modified through education which include political consciousness as well as training.
4. Further studies are suggested on the area of internet and technology use in relation to women participation in political leadership

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# COPPER AND ALUMINUM OXIDE NANOFLUIDS: COOLANTS IN A CENTRAL PROCESSING UNIT

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## ABSTRACT

The growth of supercomputers is on the rise to meet the challenges of the digital world of technology. Computers are being used to solve long manual processes into a quicker process in a period effectively and efficiently. Due to the multiple work process of computers, the Central Processing Unit (CPU) is being overworked causes its temperature to increase rapidly. When the temperature reaches its peak, it tends to shut down. Thus, the fan goes overdrive to stabilize the set temperature of the CPU. Different researches are being explored to develop new methods in cooling a computer CPU. This paper uses developmental design to illustrate a prototype novel method of cooling a CPU using copper and aluminum oxide nanofluids. It aims to investigate through experimentation the heat transfer performance of aluminum and copper oxide nano-fluids. It was found out that Ph of copper oxide nanofluid decreases while aluminum oxide nanofluid increases if the weight ratio decreases. The convective coefficient of both copper and aluminum oxide nano fluids increase if the weight ratio decreases. The results were evaluated and found out that CuO nanoparticles manifest the best results compared to Al<sub>2</sub>O<sub>3</sub> nanoparticles.

*Keywords: Aluminum and Copper Oxide Nanofluids, Convective Coefficient, Heat transfer performance*

## INTRODUCTION

Cooling is one of the most important challenges hurdled by industries including computers. Computers loaded with high power requirements needed advances in cooling. In that nanofluids are potential engineering fluids to enhance the heat transfer performance. This study aims to experimentally investigate the heat transfer performances of copper and aluminum oxide nanofluids as coolants in a computer processing unit. It involves the experimentations on the preparation of copper and aluminum oxide nanoparticles and base fluid; determining the pH and convective heat transfer coefficient of the nanofluids. These will serve as baseline data for the next researcher. Experiment set-ups were made to facilitate the reading of values of copper and aluminum oxide nanofluids' performance.

## OBJECTIVES OF THE STUDY

Based on the recommendations of previous studies and due to limited studies on aluminum and copper oxide nanofluids, the researcher opted

to study the heat transfer performance of the aluminum and copper oxide nanofluids as coolants in a computer processing unit. The new study investigated through experimentation. Specifically, it suits to answer the following questions:

1. Measure the pH value of the nano-fluids at different volume ratios.
2. Compute the convective heat coefficient of the aluminum and copper oxide nanofluids and distilled water.
3. Compare copper oxide nanofluid from aluminum oxide nanofluid as coolants of CPU of desktop computers

## REVIEW OF LITERATURE

### Preparations of the nanofluids

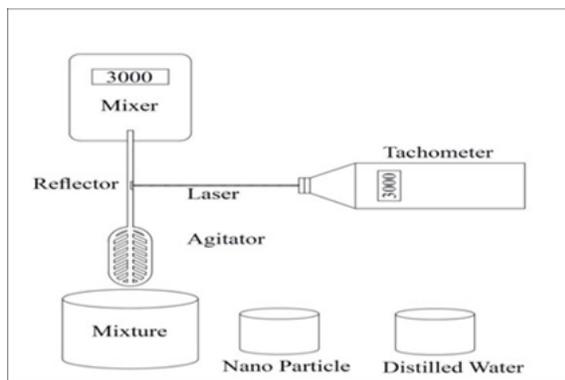
The most effective method of breaking and evenly dispersing the powder in a fluid is through the application of ultrasonic vibration (high-speed stirring also works well). Using the methodology, the nanofluids were created using the two oxide nanopowders (ZrO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>) and ultrasonic vibration was applied for more than twelve (12) hours. The resulting nanofluids initially

looked promising but were not stable with time. Though some particles dispersed, the majority formed larger agglomeration and settled out of the liquid. (Williams, Bang, Forrest, Hu, & Bongiorno, 2006).

### Two-step Method

The two-step method is the most widely used method for preparing nanofluids and the most economical method to produce nanofluids in a large scale. Nanoparticles synthesized in this method are produced first by chemical or physical methods as dry powders, then, the nanosized powder was dissolved into a base fluid in the second step process with the aid of ultrasonic agitation or high-shear mixer. The problem of this method is the agglomeration of the nanoparticles due to the high surface area, surface activity and due to Van der Waals forces. Ultrasonic equipment or high-shear mixer were used to dissolve intensively the particles reduce agglomeration of nanoparticles. This method works effectively for oxide nanoparticles while it is less effective with metallic nanoparticles.

Ebata and associates (1993), conducted the first study ever on the thermal conductivity of  $Al_2O_3$  as the nanoparticle dispersed in water as based fluid. They used the two-step method to prepare the nanofluid. In their study, they found out that the thermal conductivity of nanofluid increased as much as 32.4% using a volume fraction of 4.3% at 31.85°C. They also found out that the trend shows that as volume fraction increases, the thermal conductivity of nanofluids also increase. After this study, there have been many researchers done.



**Figure 2.1: Experimental Setup for Mixing of Aluminum/Copper Oxide Nanoparticles and Distilled Water**

### Effect of pH level

The pH value is one of the important properties of nanofluids because it affects the stability and viability of nanofluid application without causing any corrosion in the system. Leong, Murshed, and Yang (2008) studied the effect of pH in the stability of nanofluids using Titanium oxide and water as base fluid. In their experiment, they used pH 3.4 and pH 9 and found that there is a two (2) percent decrease in the thermal conductivity at pH 9. They concluded that the effect of pH on nanofluid is minimal.

Mujumdar and Wang (2008) reported that 9.5 is the optimum pH for copper and water nanofluids while 8 is the optimum pH for Aluminum oxide and water nanofluid in their conducted experiment on the optimum pH for copper/water nanofluids and aluminum oxide/water nanofluid. The result shows optimum pH differs with different nanofluids.

### Heat transfer performance of nanofluids

There are several methods to improve heat transfer efficiency. Some methods are the utilization of extended surfaces, application of vibration to the heat transfer surfaces, and usage of micro channels. Heat transfer efficiency can also be improved by increasing the thermal conductivity of the working fluid. Commonly used heat transfer fluids such as water, ethylene glycol, and engine oil have relatively low thermal conductivities when compared to the thermal conductivity of solids. The high thermal conductivity of solids can be used to increase the thermal conductivity of a fluid by adding small solid particles to that fluid (Choi, and Das 2006).

Xu (2016) reported that in comparing the heat transfer performance between the nanofluid and base fluid, it showed the different result when conducted in different parameter based plot (Reynold's number, flow rate). In Reynold's number based plot, nanofluid showed higher convection heat transfer rates versus those of the base fluid, while in the flow rate based plot it showed close heat transfer rates to those of base fluid.

Birar, Darade, and Khandalkarm (2016) in their study on the enhancement of heat transfer rate in a radiator using CUO Nanofluid reported that the overall heat transfer coefficient decreases with the increasing nanofluid inlet temperature. The overall heat transfer coefficient of the nanofluid was enhanced with 6% and 8% with nanofluid concentrations of 0.15% and 0.4% respectively as compared to pure water.

Sonal Asthana, Sunita Rattan, and Mrigando Das (2013), the study reveals that copper oxide nanofluid is better compared to aluminum oxide nanofluid in every prospect of its property. Its properties include particle size, stability viscosity, dispersion, zeta potential, thermal conductivity, and heat dissipation efficiency. They were being studied for thorough application as coolants.

Nazeema S., Nawash media M., Manzoor Hussain Suedkhader Basha and Mohd Abdul Samad (2017) Heat transfer augmentation in fluids are commonly employed by active and passive heat transfer techniques. The conventional fluids such as water, oil, and glycols don't meet the present-day requirements of high heat dissipation rates because they have poor heat transport capabilities. The design of high energy devices is only possible with new generation fluids.

Roy Jean Issa (2016), the investigation was in a block-type and radiator-type heat exchangers for an electronic system cooling. Results show that it is sufficient to cause considerable improvement in the system's thermal performance in the application of nanofluid in low concentration. The results also reveal that the increase in fluid pumping power causes an increase in the bulk flow heat transfer coefficient.

Application of aluminum and copper oxide nanofluids in a computer processing unit (CPU)

According to Gobor (2016), heat is one of the biggest enemies of desktop computers, nanofluid in every prospect of its property is generated as a form of energy loss due to the impedance of the electronic circuits in chips.

Naphon and Wongwises (2011) proposed the use of nanofluid to further enhance the thermal performance of heat transfer devices in cooling CPU. According to them the most frequently used coolants in the heat transfer devices study are air, water, and fluoro chemicals. However, the heat transfer capability is limited by the working fluid transport properties.

## METHODOLOGY

The mixture of different volume ratios has undergone experimentations to determine heat transfer capacity through three different set-ups. The workflow starts in the preparation of materials (copper/aluminum Oxide and distilled water). The first step is the mixing of the nanoparticle and the base fluid, second is for pH measurement, and the third is for the heat transfer coefficient measurement of the nanofluid. Here, high-speed mix-

ing is necessary to prevent suspension, obtained by dispersing a nanometer-sized particle. High speed so that it will not cause clogging and sedimentation. Data were gathered after which it was analyzed at different volume ratios and temperatures. Based on the results of the investigations, the conclusions were drawn which is the basis of making recommendations.

The heat was being calculated to get the value of the convective heat transfer coefficient. The experimental set-ups consist of materials needed, different apparatuses, and formulas to determine the convective coefficient.

Based on the preceding discussions, the researcher was able to come up with the following diagram:

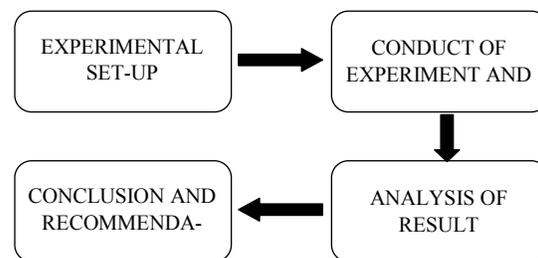


Figure 1: Flow Chart showing the steps in the conduct of the Study

The flow chart represents the step-by-step progression of the system in determining the copper and aluminum oxide nanofluids' heat transfer performances through experimentation. In the first step, three set-ups will be prepared, first for the mixing of the nanoparticle and the base fluid, second is for pH measurement, and third is for the heat transfer coefficient of the nanofluid. Analyzed gathered data is at a different weight ratio. Conclusions were drawn based on the investigation results which was the basis for making recommendations.

## WORKING PRINCIPLE

### Materials

The list of the materials, the quantity, and its function used in the experiment to investigate the heat transfer performance of copper and aluminum oxide nanofluids are at the table below.



Figure 2:



Figure 3:



Figure 4:

**Table 1: Weight Fraction of Copper and Aluminum Oxide Nanofluids**

Copper and Aluminum Oxide Nanoparticles (grams)	Distilled Water (grams)	Weight Ratio
28	280	1:1/10
14	280	1:1/20
9.33	280	1:1/30
7	280	1:1/40
5.6	280	1:1/50

This table represents the weight ratio of the Copper and Aluminum Oxide nanoparticles and distilled water.

### The Preparation of Copper and Aluminum Oxide Nanofluid

The types of nanoparticles that were studied here were the Copper and Aluminum Oxides. Copper and Aluminum Oxide particles were mixed with distilled water at different volume fractions in a glass container using a high-speed mixer to avoid agglomeration of Copper and Aluminum Oxide particles. It must be well wetted, broken down large aggregates, homogenized particles, and finally, prevented agglomeration. Then, the nanofluids pass through the different equipment and apparatus to determine the performance.

### Mixing of the Nanoparticles and Distilled water

Distilled water was added to mix the copper and aluminum oxide nanoparticles to the mixing bowl. In the mixing of the copper and aluminum oxide nanoparticles and distilled water, a high-speed blending was used to achieve the proper mixture and to reduce aggregation of the suspension.

A magnetic stirrer was used initially in the mixing of copper and aluminum nanopowders and distilled water for thirty minutes then further mixed by a sonicator for another one hour to form a nano fluid.



**Figure 5: Experimental set-up for mixing the nanoparticle with distilled water**

### Nano-fluid Ph. pH value

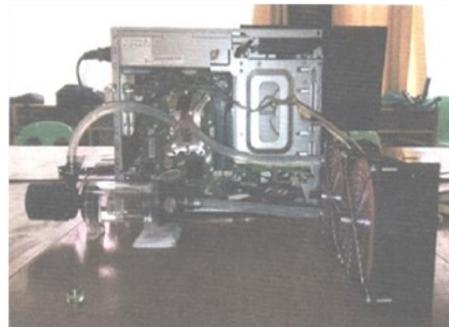
The pH of the copper and aluminum oxide nano-fluids was examined to determine the viabilities for real applications without causing corrosion to the heat transfer system. A pH meter was used to measure the pH values of copper and aluminum oxide nano-fluids samples.



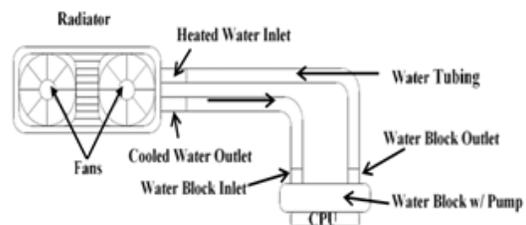
**Figure 6: Set-up measuring the pH nanofluid**

### Measuring the Capacity of the Copper and Aluminum Oxide Nanofluids to Absorb Heat in a Closed System using the Temperature Difference in the System

From the figure below, the researcher was able to measure how the copper and aluminum Oxide Nanofluids can effectively absorb heat in the system.



**Figure 7. Set-up of the Cooling System for CPU**



**Figure 8. The schematic diagram of the cooling system used**

Based on the set-up shown in the figure above, the cooling fluids absorbed the heat produced by the CPU through the water block and pumped the rejected heat to the radiator with the help of the fans. It is easily installed on any computer if the power supply connections of the pump and fans of the cooling system are universal. The ideal tube size is 3/8 or 7/16 internal diameter. Subtract the initial from the final temperature to get the temperature difference. The final temperature is measured after entering the cooling system.

### Convection Test of nanofluids:

First, mount the CPU Water Block. It starts with the CPU water block because it usually installs with a mounting backplate, there is a need to place before you can screw the motherboard to the case, and the motherboard is securely in place if any other component is positioned. The second is attached to the Radiator. Now we can move onto the radiator, the biggest integral. The radiator is installed over any fan grate that is large enough and simple, designed with screw holes that have the same dimensions as standard case fans. Once the radiator is in place, cut the tubing from the CPU to the right length and connect it to the radiator, making sure not to kink it in the process. Add the Pump. The pump should be easy to install, moderately small and can be attached almost anywhere in your case, using screws or Velcro tape. After the installed cooling system, turn the Computer On. Make sure the computer is running at maximum load. Take and record the temperature. Fill it with the copper or aluminum oxide nanofluid. Take the temperature of the core where the cooling fluid is copper or aluminum oxide nanofluid. Record the necessary data then compare if the aluminum or copper oxide nanofluids are more suitable cooling fluid than the distilled water.

## FINDINGS

### pH Level Measurement

Table 2: Total weight of the nanofluids

Weight of Water (grams)	Weight of Copper and Aluminum Oxide (grams)	Total Weight (grams)	Weight Ratio
280	28	308.00	1: 1/10
280	14	294.00	1: 1/20
280	9.33	289.33	1: 1/30
280	7	287.00	1: 1/40
280	5.6	285.60	1: 1/50

This table presents weight ratio of the nanofluids which was taken by 1 part of distilled water which is fixed at 280 grams and 28 by 280 grams of copper and aluminum oxide nanoparticles, with distilled water maintained at 20°C so that one {1} gram of distilled water is equal to one ml of distilled water.

### Results of the Experiments on the pH level of the Nanofluids

Table 3: Copper and Aluminum Oxide Nanofluid

WEIGHT RATIO	Copper Oxide			Average pH Level
	Trial			
	1	2	3	
1: 1/10	11.2	11.5	11.2	11.3
1: 1/20	11	10.8	10.9	10.9
1: 1/30	10.8	10.7	10.6	10.7
1: 1/40	10.5	10.2	10.5	10.4
1: 1/50	9.9	10.2	10.2	10.1

WEIGHT RATIO	Aluminum Oxide			Average pH Level
	Trial			
	1	2	3	
1: 1/10	5	5.1	5.2	5.1
1: 1/20	5.3	5.45	5.5	5.4
1: 1/30	5.5	5.6	5.4	5.5
1: 1/40	5.64	5.65	5.7	5.7
1: 1/50	5.78	5.62	5.7	5.7

Table 3 shows that as the weight ratio of copper oxide nanofluid decreases, the pH level also decreases. The pH increases using aluminum oxide nanofluid while decreases in weight ratio.

### Results of the experimentation on the convective heat coefficient by Nanofluids

### Results of the experiment on the specific heat of nanofluids

### Results of experimentation on the convective coefficient

Table 4: Copper Oxide Nanofluid

Weight Ratio	Heat Absorbed (kJ)	Area (m <sup>2</sup> )	Change in Temp. (°C)	Convective Heat Transfer Coefficient (kJ/m <sup>2</sup> K)
1: 1/10	356.379	0.0025	5	28510.32
1: 1/20	363.556	0.0025	5.1	28514.172
1: 1/30	372.023	0.0025	5.4	27557.237
1: 1/40	464.771	0.0025	5.8	32053.2
1: 1/50	678.473	0.0025	8.4	32308.228

Table 4 shows the convective heat transfer coefficient of copper oxide nanofluid. It shows that the convective coefficient of copper oxide nanofluid increases if its weight ratio decreases.

Weight Ratio	Heat Absorbed (kJ)	Area (m <sup>2</sup> )	Change in Temp. (°C)	Convective Heat Transfer Coefficient (kJ/m <sup>2</sup> K)
1: 1/10	3829.44	0.0025	19.1	80197.764
1: 1/20	3875.36	0.0025	19.6	79088.98
1: 1/30	4024.97	0.0025	19.8	81312.454
1: 1/40	4187.017	0.0025	20.1	83323.716
1: 1/50	4461.34	0.0025	20.1	88782.855

Table 5 shows the convective coefficient of aluminum oxide nanofluid. It also shows that the convective coefficient of aluminum oxide nanofluid increases when its weight ratio decreases.

### Distilled Water

Table 6: The pH Measurement of Distilled Water

	Mass Flow of Mixture (kg/S)	Time (S)	Change in Temperature (°C)	Specific Heat (J/Kg.K)	A pH of Distilled Water
Distilled Water	0.072916	300	9.6	4187	8.9

Table 7: Convective heat transfer coefficient of Distilled water

	Area (m <sup>2</sup> )	Change In Temperature (°C)	Heat Absorbed (kJ)	Convective heat transfer coefficient (kJ/m <sup>2</sup> K)
Distilled Water	0.0025	9.6	879.261961	36635.91504

Tables 6, and 7 show the pH level, and the convective coefficient of distilled water. The pH is 8.9, while the convective heat transfer coefficient is 36635.91504 Kj/ m<sup>2</sup>K

Table 8: Convective heat coefficients of nanofluids and distilled water

Weight Ratio	Convective Coefficient of Aluminum Oxide Nanofluid	Convective Coefficient of Copper Oxide Nanofluid	A Convective Coefficient of Distilled water
1:1/10	80197.764	28543.48	36635.91504
1:1/20	77864.576	28514.172	36635.91504
1:1/30	81312.454	27557.237	36635.91504
1:1/40	83323.716	32053.2	36635.91504
1:1/50	88782.855	32308.228	36635.91504

This table shows the different convective heat transfer coefficients of aluminum oxide nanofluid, copper oxide nanofluid and the distilled water at a common weight ratio.

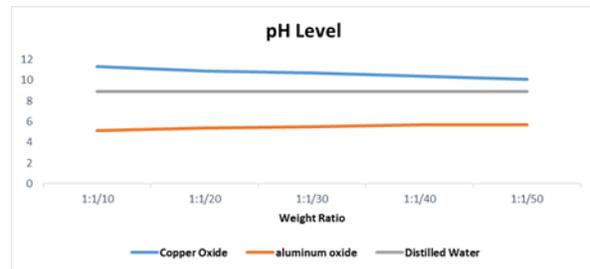


Figure 9: Graph of the pH Levels of the nanofluids and distilled water

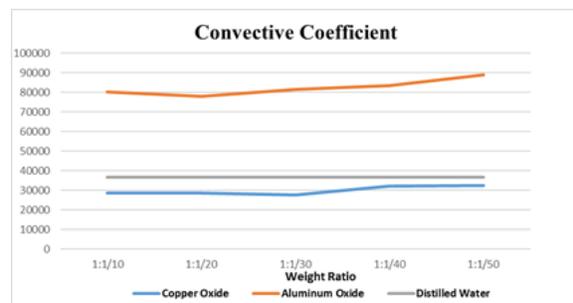


Figure 10: Graph for Convective Heat Transfer Coefficients

The graph shows the difference between the convective heat transfer coefficients of copper and aluminum oxide nanofluids with distilled water. Using copper oxide nanofluid at weight ratios 1:1/10-1:1/50, the heat convection coefficients were increasing but lower than distilled water while greater if using aluminum oxide nanofluid with increasing coefficients also.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis of the data shown in tables and graphs, conclusions and recommendations are presented. From the experimental investigation results, conclusions and recommendations are drawn.

### CONCLUSIONS

pH of copper oxide is alkaline while aluminum oxide nanofluid is acidic.

Both CuO and Al<sub>2</sub>O<sub>3</sub> have enhanced heat transfer performance.

The results showed that CuO is better to use as coolants in CPU of desktops computers.

### RECOMMENDATIONS

Based on the observations during the experimentation and tests made, the following recommendations were drawn.

Longer mixing of nanoparticle and base fluid is recommended to avoid an accumulation of nanoparticles that will block the radiator's tubing. Accumulation of nanoparticles can cause system failure, owing to the circulation of fluids that has a potential to damage the cooling system.

A further study on the use of copper and aluminum oxide nanofluids is suggested by using additional ratios in the experiment for more results.

### ACKNOWLEDGEMENT

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# LITERACY AND NUMERACY ENHANCEMENT PROGRAM FOR ALTERNATIVE LEARNING SYSTEM (ALS) AND OUT-OF-SCHOOL YOUTH (OSY) LEARNERS IN SELECTED SITES IN TACURONG CITY, PHILIPPINES

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## ABSTRACT

This descriptive study was mainly focused on evaluating the effect of the literacy and numeracy enhancement program on the learning achievements of deprived individuals in two selected locales of Tacurong City. Key participants included 6 ALS learners composed of 3 Muslims and 3 non-Muslims who were residents of the Islamic Center, Barangay Poblacion. Moreover, 10 out-of-school youth (OSY) of Barangay New Isabela took part in the activity. Initially, the implementers prepared their teaching aids and the assessment tool intended for the participants' pretest and posttest. The study was carried out in 6 months through a weekly face-to-face casual session. Results of the pretest and posttest were statistically treated using simple mean and t-test. Data analyses showed that both ALS and OSY groups have gained scores in the posttest that are relatively higher than that in the pretest. Outcomes in both literacy and numeracy program are apparently encouraging and comparable. The result implied that the program also improved the implementers professionally and socially as a result of their engagements with some actors in the community. Given the limitations of the study, it is highly suggested that the program would be sustained targeting a larger number of participants.

*Keywords: Alternative Learning System, enhancement program, extension service, literacy, numeracy, out-of-school youth*

## INTRODUCTION

In Sultan Kudarat State University, since program accreditation was advocated in 2007 the Extension Services of the College of Teacher Education (CTE) have been steadily active. True to its mandate of providing progressive leadership in its areas of specialization, it desires to contribute to the community in facilitating the delivery of knowledge and skills mainly to the underserved communities. With the varied expertise of its faculty, it is committed to serve off-campus according to the identified needs of the target beneficiaries. Usually, the capacity to provide formal or alternative mode of instruction particularly on basic education comes as the most convenient service that the college can readily share.

As the alternative learning system (ALS) is one of DepEd priority programs nowadays, the CTE extension workers found it practical to engage on it. Given the supportive and facilitating role of the university, the implementers thought of

forging an agreement with the latter to exercise the institutional function of extension. While Barangay Poblacion of the city hosts one of the deprived communities known as "Islamic Center" where some ALS learners live, thus, it was considered very appropriate for the activity to be carried out therein. Moreover, Barangay New Isabela was pegged to have many out-of-school (OSY) based on school data. Considering that there was an apparent need to embark on learning enhancement among these ALS and OSY, the faculty-implementers took the challenge in responding to the educational needs of these learners through a modest literacy and numeracy program. Equally, as research and extension activities are not disjoint, hence the study.

## Statement of the Problem

Primarily, the study aimed at describing the effect of the literacy and numeracy enhancement

program to the key participants and the implementers.

In specific terms, it sought to satisfy the following objectives:

1. To describe the learning achievements in English and Mathematics of the ALS and OSY participants in terms of the pretest, post-test and gain scores.
2. To test the difference between the ALS and OSY participants' learning achievements.
3. To find out the effects of the literacy and numeracy enhancement program to the implementers.

## Literature Review

Historically, the extension services in the country have been in practice since the Spanish era and it was recognized as a national system only in 1952 (Gonzales & Maghamil, 2009). It was also indicated that a community-based approach made its significant application relative to extension works in the 1970's. The community development work was facilitated by the Department of Local Government and Community Development (now DILG) which acted as the coordinating body. In the 1980s, non-government organizations (NGOs) started and participated as acceptable channels for direct assistance.

To date, extension service is one of the mandated functions of all public higher educational institutions (PHEIs) in the Philippines aside from instruction and research. Republic Act 7722, otherwise known as the Higher Education Act of 1994, mandates institutions of higher learning like state universities and colleges (SUCs) to respond to the call for societal transformation to serve the poorest of the poor, the less privileged, the deprived and the oppressed. In its own Charter, SKSU is directed to "provide advanced instruction and professional training in science and technology, agriculture, fisheries, education and other relevant fields of study". Likewise, it is required to undertake research and extension services (Section 2, RA 9966).

In 2016, the Commission on Higher Education issued CMO No. 52, s. 2016 to provide competition-driven grants or assistance for their competent faculty members who wants to engage in extension works. Considering that universities served as producers of knowledge or hubs of innovations, they are in the position to partner with the communities, industries or businesses in facilitating transfer of knowledge and technology to

development areas particularly affecting communities. This mechanism prompted many extension activities or community engagements to be organized among HEIs in the country.

In the General Appropriations Act (GAA), extension service is defined as an inherent function of institution of higher learning with the aim of initiating, catalyzing, and sustaining the development of various communities, using their experience and available resources. In his study, Medina (2018) pointed out that other higher education institutions today have encouraged a transformed style of relationship between the academe and the client community. Advocates would often refer to it as "engagement". However, not all academic institutions are swiftly able to develop these engagements with the public. Hence, an assessment of their competence to address the apparent weaknesses needs to be done to effectively leap into such endeavor in the future.

Also, some liberal private HEIs even have extension activities which they dubbed as "outreach" programs while others regarded it as corporate social responsibility (CSR). In his CSR study at a Catholic University, Ramel (2013) mentioned that academic programs should "empower individuals, liberate the mind from ignorance, cultivate social responsibility, inquiry and intellectual powers, engage students, and foster civic engagement and social responsibility in integrative learning." Basically, the intent of CSR is the same as the extension services of SUCs which proceeded to community or stakeholders' transformation.

Thus far, several studies on impact among extension programs in the country have been carried out (Brillantes, Cuthbertson and Tumanut, 2004; Tacbas, De Vera & Romo, 2010; Bidad and Campiseño, 2010; Llenares and Deocarís, 2018; Mendoza, Binoya & Cardenas, 2017). Generally, results indicated that extent of impact ranged from moderate improvement in community knowledge, attitude, and lifestyle to improved long-term outcomes after the completion of any extension program. Constraint on best outcome is often due to the fact that faculty implementers are preoccupied with heavy academic loads while doing extension works. Typically, it ended up on piloting stage as no personnel would stay in the villages to sustain the efforts.

Llenares and Deocarís (2018) cited that extension program of HEIs have varying delivery modes. They discussed that there are delivery approaches that deal on utilizing students to help local groups and other ways that involve faculty

and staff programs to attend to community development in the form of “educational cohorts, social service, public health, and livelihood and technical training, consultations and direct application of R&D output.” Daquis et al. (2016) cited that most common examples of extension activities are those dealing with livelihood, health promotion, and computer literacy programs.

Remarkably, community extension services are not simply limited to the needs of community but to the vision and mission of the institution. It also extends to the opportunities to make education accessible to the poor and to pursue a socially relevant education addressed to the young, poor and the youth at risk, and to promote the Filipino value of unity by ensuring justice and human dignity (Dilao, n.d.).

## METHODOLOGY

The study was descriptive-evaluative in nature. It was carried out to 6 ALS learners and 10 out-of-school youth in a couple of barangays in Tacurong City, namely: Poblacion and New Isabela, from July 1, 2017 to June 30, 2018. The Islamic Center in Barangay Poblacion was selected to be the setting as it has the highest registrant of ALS learners based on DepEd data. Moreover, New Isabela was recognized with the most number of OSY in the city. The DepEd ALS and the Barangay LGUs provided the identity of the target learners and OSY, respectively. The participants were limited since attendance to the learning activity was voluntary.

In carrying the study, the program implementers developed and used two sets of teaching modules, i.e., one in literacy (English), and the other in numeracy (Mathematics) theme. College experts validated these pedagogical materials prior to utilizing them in teaching sessions. Actual implementation began with the participants’ orientation and the subsequent administration of pretest. The learning enhancement took place weekly every Friday morning. It was held at the Purok Center in Poblacion while at Barangay Hall in New Isabela. Most often, the service support of the barangay was solicited to warrant maximum attendance of participants. The session ordinarily started with a prayer, then stating the learning objectives, presentation of lessons, guided exercises, independent activity through seatwork, reinforcement, and concluded by an assessment. To encourage learners’ attendance, the researcher-implementers ensured that free snacks were provided to partici-

pants each meeting. Learning activities became interactive and lively because implementers usually inserted engaging dances and games. Posttest was administered at the close of the program. Personal and direct observations were also utilized to collect information during immersion.

In analyzing the gathered data, statistical tools like mean and t-test of independent and dependent means were applied. The level of significance was set at .05 level of significance.

## FINDINGS AND DISCUSSIONS

### 1. On Learning Achievements

Table 1 shows the learning achievements of the ALS and OSY participants in English and Mathematics lessons as result of literacy and numeracy enhancement program. Pretest, posttest, gain scores as well as differences are presented and analyzed through t-test. Mean Gain is defined as the average differences between the posttest and the pretest scores.

As indicated, the learning achievements in literacy of both groups relatively increase at certain level from pretest to posttest, that is, 13.83 to 17.67 and 13.00 to 21.10 for ALS and OSY, respectively. Closer analysis of these data, however, revealed that trend for each group is opposite as the high score during pretest tends to lower in the posttest, whereas the low in the pretest becomes higher in the posttest. Contrary, the pattern of scores in numeracy is different yet reliable because both achievements in the pretest of both groups consistently improve in the posttest. Generally, gains in scores are all positive across groups and programs indicative that changes in learning achievements possibly occur.

**Table 1. t-test Analysis on the Literacy and Numeracy Enhancement Results**

Group	n	Pretest Mean Scores	Posttest Mean Scores	Mean Gain	Df	t-stat	t-critical @.05
<b>Literacy</b>							
ALS	6	13.83	17.67	3.83	5	4.84*	2.57
OSY	10	13.00	21.10	8.10	9	5.71*	2.26
t-stat		0.33	1.59	2.19*			
<b>Numeracy</b>							
ALS	6	11.67	15.50	3.83	5	3.66*	2.57
OSY	10	13.30	20.40	7.10	9	5.34*	2.26
t-stat		0.58	2.45*	1.71			
t-critical @.05		2.14	2.14	2.14	14		

Note: \*- significant

## 2. Differences of Learning Achievements in Literacy and Numeracy

Data on the same table indicates that the learners' literacy achievement in the pretest and posttest are significantly the same for both ALS and OSY groups ( $t=0.33 < t_{\text{tab}[.05,14]}=2.14$ ;  $t=1.59 < t_{\text{tab}[.05,14]}=2.14$ ). It can be inferred that both groups have observable increase in learning level after the enhancement program was conducted. This is evident as there is significant difference between the pretest and posttest results ( $t=4.84 > t_{\text{tab}[.05,5]}=2.57$ ;  $t=5.71 > t_{\text{tab}[.05,5]}=2.26$ ). The finding is implicit and difficult to dispute that no learning takes place. The difference between pretest and posttest scores that is statistically significant is enough proof to offer. On teaching and learning, Masters (2018) simplified the role of evidence – those evidences available from the past assessments. It may also involve administering tests such as the pretest to identify appropriate starting points.

In the same way, comparing the mean gain scores of the two groups shows that the OSY had significantly improved their score over the ALS learners ( $t=2.19 > t_{\text{tab}[.05,14]}=2.14$ ). From these data, the researcher-implementers concluded that the enhancement activity helped the learners to improve their literacy level whether the participants are OSY or ALS. In other words, the Literacy Enhancement Program is a positive intervention in assisting deprived learners in the communities.

Moreover, the learners' numeracy achievement level in the pretest are the same for both ALS and OSY groups ( $t=0.58 < t_{\text{tab}[.05,14]}=2.14$ ). On the contrary, the OSY has relatively higher score than the ALS group in the posttest ( $t=2.45 > t_{\text{tab}[.05,14]}=2.14$ ).

It can be established further that both groups have evident learning after the numeracy enhancement program was introduced. It is indicated by a significant difference in the pretest and posttest results ( $t=3.66 > t_{\text{tab}[.05,5]}=2.57$ ;  $t=5.34 > t_{\text{tab}[.05,5]}=2.26$ ). However, the mean gain of the 2 groups shows that both groups of OSY and ALS have the same amount of learning ( $t=1.71 < t_{\text{tab}[.05,14]}=2.14$ ). Generally, the data provides inference that the enhancement activity provided opportunity for the learners to improve their numeracy level whether the participant is an OSY or ALS. It suggests then that the Numeracy Enhancement Program is a valid mechanism that can help other beneficiaries of similar characteristics.

## 3. Effects to Program Implementers

On top of these indications, the implementers recognized that the experiences they have with the two (2) communities in the city are extensive and very valuable. Observing the ALS learners and OSY's enthusiasm to learn despite the unfriendly environment motivates them to keep coming back in the communities every week. They felt fulfillment and pleasure in serving these unfortunate individuals who were deprived of opportunities available to typical students. What is more essential was the fact that the implementers learned to associate with the community leaders, the barangay officials and the beneficiaries themselves. As educators who are used to formal setting, they were able to appreciate the difficulties and realities of learning under adverse situation as well as life among underserved members of the society.

The foregoing findings are indications that the extension service of SKSU-CTE is relevant and working. Despite its narrow scope, the initiative tends to show an affirmative outcome. As the DepEd ALS program needs a design improvement and higher OSY participation according to World Bank experts (Tomacruz, 2018), the completed enhancement initiative is still laudable to some extent.

## CONCLUSIONS

From the preceding analysis and discussion of results, these essential conclusions are drawn:

1. The learning achievements of ALS and OSY participants have opposite trend in literacy, while these were normal or consistent in numeracy.
2. Literacy and numeracy enhancement program was effective as there were evident changes in learning achievements. Regardless of whether the learner was ALS or OSY, it was well settled that posttest mean scores were relatively higher than the pretest mean scores.
3. Indeed, the literacy and numeracy enhancement program promoted the professional and social growth of the implementers.

## RECOMMENDATIONS

It is obvious that the Literacy and Numeracy Enhancement Program had promoted the learning achievement of the selected participants as well as the implementers, it is thus suggested that the activity be sustained utilizing a larger group of ben-

eficiaries. It can also be replicated in other underserved communities that are duly identified by the city government. Finally, the utilized instructional materials like the modules and assessment tools may be improved so as to meet the needs of a bigger and more diverse group.

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