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5. The articles may either be written in English or Filipino. All articles written in either languages must be accompanied by an Abstract which is written in English.

6. All contributions must be original.

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MARKETING PRACTICES OF COCONUT FARMERS IN NORTHWESTERN CAGAYAN

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ABSTRACT

This descriptive correlational research focused on the coconut farmers' profile and the relationship to their marketing practices in Northwestern, Cagayan using the questionnaire and checklist as data gathering tool. The coconut farmers' profile and their marketing practices were correlated using the Pearson R and Chi- Square test. The coconut farmers are mostly males, 56, high school graduate, married, and have been in the industry for 10-19 years with a mean annual income of P 14,225 to include other sources as rice and vegetable farming and poultry. Majority own their 0.5 – 0.99 hectare land, with an average of 50 – 99 productive trees and an average of less than 500 nuts per harvest twice a year. They sometimes grow and sell young and matured coconut seedlings, seldom use a method in determining the price, distributing, and selling their coconut products, and never use a method in promoting their product. The unpredictable market price of the coconut is their persistent problem encountered. Profiles of the coconut farmers' affect their marketing practices. Growing intercrops for maximum resource utilization, employing methods of promotion to build awareness and monitoring coconut price regulation and capacity building on technology adoption for higher marketability and productivity on value added coconut products are recommended.

Keywords: Northwestern Cagayan, Marketing, Practices, Coconut, Farmers

INTRODUCTION

Coconut production plays an important role in the global economy as the demand for coconut products continues to grow worldwide. The economic importance of this tree crop is evident from the fact that it is grown in more than 90 countries across the world in an area of 14.231 million hectares producing about 57.514 billion nuts or 10.52 million tons of copra. In 2013, the Coconut Handbook cited, that the estimated global production of coconuts was 73,811,551,000 coconuts or 2,896,709 MT in copra equivalent. Today, the main producers in the world are Indonesia, the Philippines and India.

The coconut industry is a dominant sector of Philippine agriculture. Of the 12 million hectare of farmlands, 3.25 million hectare is devoted to coconut, and there are 3.5 million of coconut farmers and farm workers who are dependent on the industry (rboi.armm.gov.ph). It plays a key role in shaping national development as it provides an income, employment and foreign exchange to the Philippine economy. This is supported by the research of the National Anti- Poverty Commission (2013) stating that the Philippines is among the world's largest producer and exporter of coconut products, accounting for 23% of world production and 59% of world export.

The coconut (Cocos nucifera L.) is popularly known as the "Tree of Life" because of the variety of products and by-products made from the tree. In fact, Alberto and Galvez (2004) enumerated several economic importance of the coconut palm including timber; food; fermented and unfermented drink; alcohol; vinegar; thatching mat; splints; strips and fiber for making baskets, mats, ropes, hats, brushes, brooms and other articles; fuel caulking mat; utensils for households such as cups, bowls, spoon, and the like; oil for food cooking, illuminations, for making soap, substitutes for butter and lard, ointments; and oil cake for feeding domestic animals and for fertilizers.

In Cagayan, aside from the young and matured coconuts that are usually traded, other products are also marketed like coconut water, copra, virgin coconut oil, coco vinegar, coco chips, nata de coco, bukayo, latik, desiccated coconut, coco fibers, geotextiles, and home decorations. For this reason, many Cagayanos are optimistic in growing coconut trees, for household and business consumption. In a statement of Tejada as reported by Licas, coconut industry in Cagayan covers 12 towns with an aggregate area of at least 10,000 hectares.

The continual harvests of coconut thus lead many Cagayanos to expand the utilization of the different parts of the coconut tree. However, the weakness of coconut farmers to produce more value- added products through village- based enterprises explains their limited market participation and hence, low income earnings (National Anti- Poverty Commission, 2013). Aside from problems of low productivity and small farm sizes, coconut farmers are confronted with marketing -related difficulties such as the low and highly fluctuating prices and inability to find favorable market outlets for their products, Pabuayon, et al. (2009) added. Moreover, the current marketing practices in coconut are a major constraint as they provide the average farmer a very small margin of profit.

In the recent years, government institutions have been dealing with coconut farmers and laborers in various localities of Cagayan. Yet, researches on marketing practices are still on dearth. Thus, the research "Marketing Practices of Coconut Farmers in Northwestern Cagayan" could help broaden the perspective and further facilitate their understanding on issues related to the coconut industry. The study could help in better understanding how the industry works, to better familiarize with the issues concerning the industry, to be able to conduct a better marketing program, and to help improve the condition of coconut farmers. Hence, this study is conducted to analyze the marketing practices employed by coconut farmers in Northwestern Cagayan.

STATEMENT OF THE PROBLEM

Generally, this study aimed to identify the marketing practices of coconut farmers in Northwestern Cagayan.

Specifically, it sought answers to the following questions:

1. What is the profile of the coconut farmers in terms of: Age, Sex, Civil status, Highest educational attainment, Years in the industry, Annual income from coconut farming, Coconut land ownership, Coconut land area (in hectares), Number of productive coconut trees, Average number of nuts per harvest, Times to harvest per year, and Occupation other than coconut farming
2. What are the marketing practices of the coconut farmers as to the following: Product, Price, Placement/ Channel of Distribution, and Promotion
3. What are the most common problems encountered by the coconut farmers along selling of the products?
4. What benefits do coconut farmers derive from the industry?
5. Is there a significant relationship between the profile of the respondents and their marketing practices?

METHODOLOGY

The study was conducted in Northwestern Cagayan particularly in the municipalities of Sta. Praxedes, Claveria, Sanchez Mira, Pamplona, Abulug and Ballesteros. The Slovin's Sampling Formula was used to identify the number of respondents and the stratified random sampling was used to determine the total number of respondents taken from the total number of the population. From the 1,070 respondents, 91 were from Sta. Praxedes, 272 from Claveria, 56 from Sanchez Mira, 84 from Pamplona, 180 from Abulug, and 387 from Ballesteros. The study adopted the descriptive- correlational research since the study described and related the profiles. Relevant data were collected from farmers by structured questionnaire using purposive sampling and convenience sampling technique. An interview was also

used for more reliable result. In describing the profile of the respondents, frequency count, mean and percentage were used. A 5-point Likert scale was used to determine the marketing practices and the Pearson R and the Chi- square were used to test the hypothesis.

FINDINGS OF THE STUDY

PROFILE OF THE RESPONDENTS

Age Distribution

Figure 1 shows that most of the coconut farmers are 60-69 years old with the frequency of 69 or 23.7 percent. The overall mean age is 56.4 years old which means that this age level is considered as seasoned coconut farmers and have worked for quite number of years in the farm.

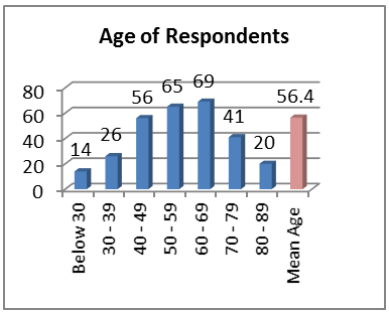

Figure 1. Age distribution of respondents.

Sex Distribution

Figure 2 shows that of the 291 respondents, 209 are males and 82 are females in which the former constitute 71.8 percent of the total population and the latter, 28.1 percent. This is similar to the findings of Mercado (2015) that farming profession is dominated by men because of the bulk of work.

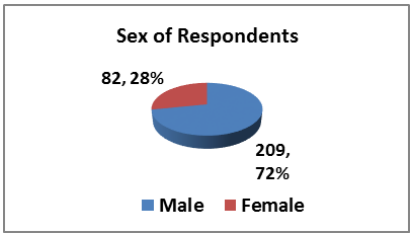

Figure 2. Sex distribution of respondents.

Civil Status

For the civil status of the respondents, Figure 3 shows that out of 291 respondents, there are 211 or 72.5 percent who are married; 42 or 14.4 percent widowed; 35 or 12.1 percent single; and 3 or 1 percent separated. This finding reveals that majority of the coconut farmers are married.

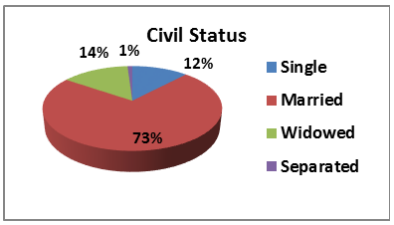

Figure 3. Civil status of respondents.

Highest Educational Attainment

Figure 4 shows the highest educational attainment of the respondents. There are 64 or 22 percent of the respondents who are High School graduate. This finding reveals that the majority of the respondents are high school and college graduate. Hyman (1988) as mentioned by Mercado (2015) disclosed that knowledge and intelligence are correlated with educational attainment. Thus, farmers with high educational attainment tended to have a better production than those with lower educational attainment.

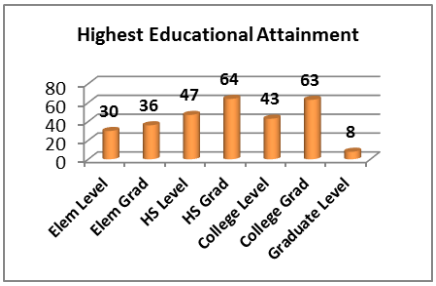

Figure 4. Highest educational attainment of respondents.

Years in the Coconut Industry

Figure 5 reveals the number of years that the coconut farmers have been in the coconut growing industry. The data shows that 81 or 27.8 percent of the total population have been in the industry for 10 – 19 years. We can say then from this data that coconut farmers have been in the industry for at least less than a score.

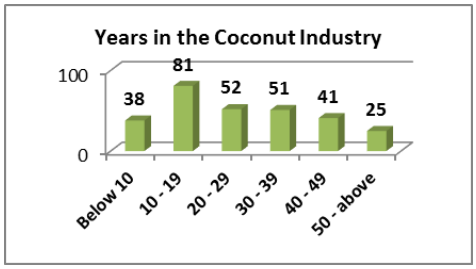

Figure 5. Years in the coconut industry.

Annual Income from Coconut Farming

Figure 6 reveals the annual income of the farmers from coconut farming. There are 123 farmers or 42.3 percent of the total population have the annual income ranging from P10,001 to P20,000. The Mean annual income of the coconut farmers is P14,225 which is lower than the average annual income of every Filipino farmers which is P100,000 as of 2015. This finding manifests that if coconut farming is the only livelihood, it must reveal a very low income among coconut farmers in the Northwestern Cagayan.

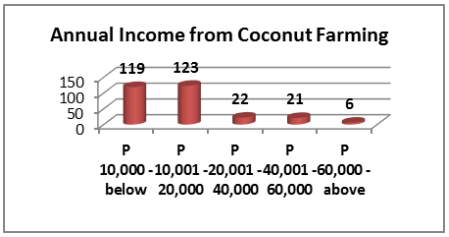

Figure 6. Annual income from coconut farming

Coconut Land Ownership

For the land ownership of the respondents, Figure 7 shows that out of 291 respondents, there are 246 or 84.5 percent who own their coconut farm; 38 or 13.1 percent are tenants and 7 or 2.4 percent only others: rent, lease or mortgage the coconut land. This proves that majority of the coconut farmers own their own land.

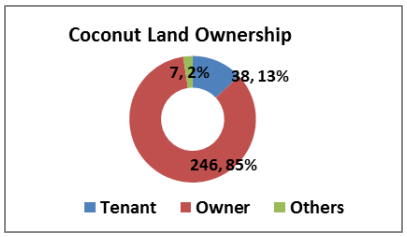

Figure 7. Coconut land ownership.

Coconut Land Area (in Hectares)

Figure 8 reveals the total land area of coconut farms cultivated by the respondents. Among coconut farmers cultivating varying size of the farmland of coconut, 73 or 25.1 percent have a cocoland area of 0.5 to 0.9 hectares.

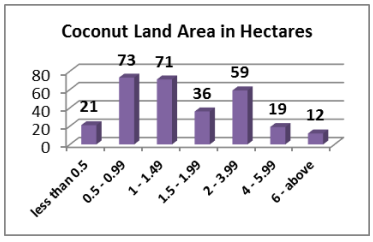

Figure 8. Coconut land area in hectares.

Number of Productive Coconut Trees

Figure 9 reveals the number of coconut trees planted. It shows that 111 or 38 percent grow 50 to 99 coconut trees; 82 or 28.2 percent grow less than 50; 49 or 16.8 percent have 100 to 199; 17 or 5.8 percent grow 300 to 399 and 9 or 3.1 percent grow 400 trees or more. This finding reveals a very low production of coconut based on the grown coconut trees in the area.

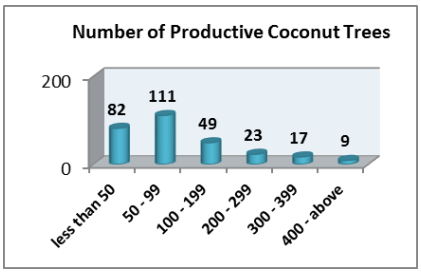

Figure 9. Number of productive coconut trees

Average Number of Nuts per Harvest

The data in Figure 10 show that 127 or 43.6 percent of farmers can have less than 500 coconut fruit per cropping, 126 or 43.3 percent harvest 500 to 999. It can be understood from this finding that the coconut fruits harvested for every cropping may range from 500 to less than 2,000 pieces.

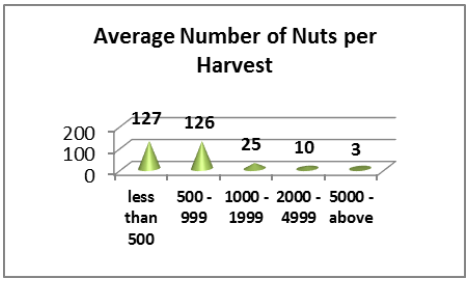

Figure 10. Average number of nuts per harvest.

Times to Harvest per Year

Figure 11 reveals that out of the 291 respondents, 143 or 49.1 percent harvest their products twice a year.

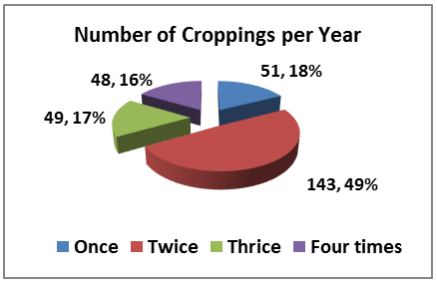

Figure 11. Number of Croppings per year.

Occupation Other than Coconut Farming

As to the profile variables of the coconut farmers, this study found out that they have other sources of income other than coconut farming. 236 or 81.1 percent which means majority of the coco farmers have their own livelihood. This also manifests that coco-farming is not the primary source of income but only secondary.

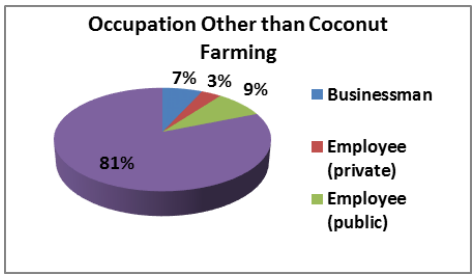

Figure 12. Occupation of respondents other than farming.

MARKETING PRACTICES OF COCONUT FARMERS

Product

As regard to the different ways in selling the coconut products, "Selling matured coconut" and "selling young coconut" were often used by the respondents as a manner of selling their coconut products with a mean of 3.52 and 3.37 respectively. Selling them both has a higher mean value which is 3.37. This means that coconut farmers sell both matured and young coconut at the same time. It means that farmers do not reserve the matured and young coconut to specific buyers but sell them both at the same time.

On the other hand, respondents also sometimes grow and sell coconut seedlings with a mean value of 2.99. It means that many of the respondents used this scheme to increase their annual income since coconut seedlings has a higher value as compared to young and matured coconut.

It is understood that the respondents do not engage themselves in "buy and sell" among themselves just to help one another dispose their products. This has a mean of 1.46. This indicates that there are middlemen who usually buy their coconut products.

The different ways in selling the coconut products obtained a total weighted mean of 3.01, which is "Sometimes".

Pricing

In terms of pricing their products, the farmers "Often" negotiate with buyers with a mean of 3.80. This means that this method in determining the price of coconut products prevail over the other methods.

The items on the "price depends on the supply of coconut" and "price depends on the kind and size of the coconut" were sometimes used as methods in determining the price of their coconut products with a mean of 2.32 and 2.96 respectively. Matured and young coconuts are then being classified. Coconut seedlings are also considered a kind of item. Coconut products are then classified according to sizes and were being given a corresponding size. In this aspect, farmers usually choose a good variety of coconuts having that big size to assure them of a higher income. This is also the pricing strategy used in Tamil Nadu, India as explained by Moorthi (2001) where tender coconuts are sorted out at the retailer level according to their size. The bigger the coconut, the higher the price due to consumer preference and belief that it contains more coconut water.

Seldom that the price of coconut depends on the demand of the market with a mean of 2.20.

Respondents "Never" determine the price of their coconut products based on their expenses in maintaining their coconut farm with the mean of 1.61.

The different methods used in determining the price of the products had a total weighted mean of 2.58, which is "Seldom".

Placement/ Channel of Distribution

In relation to the method used in distributing the product, the item ''I sell my coconut products to traders as wholesale basis'' has a mean of 4.39 and with a descriptive value of ''Always''. This means that the respondents all the time disposed their coconut products to traders on a wholesale basis. This practice is advantageous on the part of the farmers for it is lesser expenditure and less labor is applied. For the item '' I sell my coconut products direct to processors'' has a mean of 2.58 having a descriptive value of ''Seldom''. This means that the respondents seldom sell their coconuts direct to processors. This is because in Northwestern Cagayan, there are only few processors of coconut like the copra and others are SME's. The item ''I sell my coconut products in the local market'', ''I sell my coconut products through direct orders and delivery'' and '' I sell my coconut products through display along areas where people usually pass by'' have a respective

mean of 1.62, 1.41, and 1,42 each has a descriptive value of ‘’Never’’. This means that the respondents never do the said items mentioned. Those aforementioned practices usually are applied to farmers who have lesser production which cannot command the attention of wholesale buyers. This implies that the coconut farmer- respondents produce good volume of coconut that attracted wholesale buyers.

The method used in distributing the coconut product had a total weighted mean of 2.28 with a corresponding descriptive value “Seldom”.

Mode of Selling the Product

When it comes to the mode of selling of the coconut products, the indicator “I sell my coconut products by bulk” got a mean of 4. 23 which means “Always”. This means that the respondents always sell their coconuts in bulk or in volume. This is true because of the trend now that the traders are the ones who directly approach the farmers and set the price and harvest agreement. The item “I sell my coconut products by order only” has a mean of 3.36 corresponding to a descriptive value of “Sometimes”. This means that respondents sometimes sell their coconuts by order because in the locality there are SME’s who actually need small scale coconuts therefore they make their orders to the farmers. The items “I sell my coconut products in trade fairs or marketplace”, “I sell my coconut products in an open market through retail”, and “I process my coconut products and sell to consumers” have a mean of 1.36, 1.20, and 1.59 respectively with an equivalent descriptive value of “Never”. This means that the respondents never use these modes of selling and processing their coconut products because they find it burdensome, expensive and time consuming if they do use these modes. Therefore, they just prefer to sell directly to the traders for their own advantage.

The mode of selling the coconut products obtained a total weighted mean of 2.35 which means “Seldom”

Promotion

As regard to the methods used in promoting the coconut products, the five indicators are described as “Never”. These items are “I promote my coconut products through the internet”, “I promote my coconut products through flyers as form of advertisement”, “I promote my coconut products through radio advertisement”, “I promote my coconut products through billboards”, and “I promote my coconut products by giving free for every certain total number sold”. Each of items has a weighted mean of 1.13, 1.10, 1.04, 1.04 and 1.36 respectively. The overall mean of 1.13 shows that farmers “Never” used any method in promoting their product. The result of the study implies the strong demand for coconut that buyers are the ones surveying the community of potential source of good quality coconut.

PROBLEMS ENCOUNTERED BY COCONUT FARMERS

Table 1. Problems encountered by respondents along marketing aspect

Problems	Frequency	Rank
No problem	92	2
Stiff competition	8	7
Lack of market outlet	17	5
Unpredictable market price	140	1
Unpredictable demand and supply	67	3
Cancellation of orders	9	6
Lack of transport facility	18	4
Unmet deadline of deliver/ delayed delivery	5	8
Bad orders	3	9
Reduction of orders	2	10

As gleamed in Table 1, the most pressing problem faced by the farmers is the unpredictable market price for their coconut products. This happens because most of the time the trader sets the price for the coconut, particularly for matured and young coconut fruits. There are situations where traders would give a fix minimal amount for the nut and some would price the nuts depending on the kind and size, e.g, three small coconuts for the price of two or categorize them as Class A or Class B. This is parallel with the analysis of Sathya and Murugesh (2015) in their study of coconut marketing in Pollachi Taluk where they concluded that coconut production is slowly losing its position because of unremunerative price. As the consumer price for a coconut is getting low, it clearly shows that the marketing system is not favorable to the farmers.

The identified respondents also encounter lack of transport facility. Even if coconut farmers would like to sell their products themselves in nearby provinces or metropolitan areas, they cannot do so because they lack the transportation/ delivery equipment that will enable them to do it. This is consistent with the study of Batugal, et.al., (1998) that seldom does a farmer sell his/her produce directly to the wholesaler’s market because of poor farm-to-market road and lack of transport.

Table 2. Problems encountered by coconut farmers along financial aspect.

Problems	Frequency	Rank
No problem	200	1
Cash shortage	40	2
Poor collection of receivables	34	3
High interest rate of borrowed capital	5	5
Inadequate financial support	14	4

Table 3. Problems encountered by respondents along personnel aspect.

Problems	Frequency	Rank
No Problem	207	1
Cannot look for laborer to gather	10	5
Demanding employees	19	4
Lack of technical know how	22	3
High cost of maintenance	40	2

Some respondents identified cash shortage as their problem along financial aspect and high cost of maintenance along personnel aspect as shown in Tables 2 and 3. Nonetheless, majority of them did not encounter problems along these two aspects.

BENEFITS DERIVED FROM THE COCONUT INDUSTRY

Based from the data gathered, majority of the respondents mentioned that the benefits they derive from the coconut industry, serves as an additional income for the family. Where most of the farmer- respondents have their own family to sustain and children to send to school, the income that they generate from the sale of coconuts serves as means to finance their basic needs.

SIGNIFICANT RELATIONSHIP BETWEEN THE PROFILE OF THE RESPONDENTS AND THEIR MARKETING PRACTICES

Table 4. Relationship between profile of respondents and their ways of selling

Profile	r – value	Probability Value	Remarks
Age	.102	.085	NS
Sex	.044	.111	NS
Civil status	.030	.609	NS
Highest Educational attainment	.037	.528	NS
Number of years as coconut farmer	-.030	.611	NS
Annual income from coconut farming	.281	.000	S
Land ownership	-.102	.085	NS
Land owned	.094	.111	NS
Number of productive coconut trees	.030	.609	NS
Average number of nuts per harvest	.037	.528	NS
Times to harvest per year	-.030	.611	NS
Occupation other than coconut farming	.281	.000	S

Table 4 presents the relationship between profile of respondents and their marketing practices in terms of ways in selling the coconut products. The table reveals that out of 11 profile variables included in the study, the "annual income from coconut farming" and "occupation other than coconut farming" are found to be significantly related to marketing practices or ways in selling the coconut product.

One of the possible scenario is that farmers usually choose the best and the most productive ways of selling coconut products that suits the time or season of the year for them to be assured of a higher annual income from coconut farming. It also means that failure in choosing the best ways of selling coconut products that suits the season of the year would mean a lesser income from coconut production.

On the other hand, occupation other than coconut farming has a significant relation with ways in selling the coconut products of farmers. Farmers who focused most of their time in coconut farming have enough time to plan for the best strategies in disposing their products. Professionals who engaged in coconut farming usually spent the least of their time and thereby neglecting and disregarding many of the problems encountered in the production and marketing activities.

Table 5. Relationship between profile of respondents and the method used in pricing

Profile	r – value	Probability Value	Remarks
Age	-.040	.497	NS
Sex	-.010	.868	NS
Civil status	-.053	.366	NS
Highest Educational attainment	.065	.267	NS
Number of years as coconut farmer	.067	.257	NS
Annual income from coconut farming	.239	.000	S
Land ownership	-.040	.197	NS
Land owned	-.010	.868	NS
Number of productive coconut trees	-.053	.366	NS
Average number of nuts per harvest	.065	.267	NS

Times to harvest per year	.067	.257	NS
Occupation other than coconut farming	.239	.000	S

Table 5 shows the relationship between the profile of the respondents to the methods used in determining the price of coconut products. It was found out that only annual income from coconut farming and occupation other than coconut farming to be significantly related to the methods used in pricing.

With an r-value of .239 and probability value of .000 annual income from coconut farming is significantly related to the methods used by the respondents in determining the price of their coconut products. Coconut farmers knew exactly if what is the current price of their products and they could even increase it through a win-win negotiation with the wholesale buyers. Therefore negotiated price would probably predict a high annual income from coconut production.

Having an occupation other than coconut farming is also significantly related to the methods in determining the price of coconut with .239 r-value and .000 probability value. However, the most important thing to consider is their time devoted to production and marketing of coconut. Farmers who focused most of their time in coconut farming spent most of their time in studying/ analyzing the unpredictable changes in the prices of their products. Farmers of coconut who spent the least of their time in coconut production are not so much interested in the changes of prices for they are not after the high income but just an additional income of their profession.

Table 6. Relationship between profile of respondents and method used in distributing the product.

Profile	r – value	Probability Value	Remarks
Age	-.077	.195	NS
Sex	.014	.817	NS
Civil status	.079	.176	NS
Highest Educational attainment	.049	.403	NS
Number of years as coconut farmer	-.118	.045	S
Annual income from coconut farming	.376	.000	S
Land ownership	-.077	.195	NS
Land owned	.014	.817	NS
Number of productive coconut trees	.079	.176	NS
Average number of nuts per harvest	.049	.403	NS
Times to harvest per year	-.118	.045	S
Occupation other than coconut farming	.376	.000	S

Table 6 shows the relationship between the profile of the respondents and the methods used in distributing their coconut products. The number of years as coconut farmers, their annual income from coconut farming, the number of harvest per year and occupation other than coconut farming are significantly related to the method used in distributing their coconut products to farmers.

The long number of years the respondents have been engaged in coconut farming have given them enough experience to know the best methods of distributing their coconut products of an assured high income. Therefore, one of the factors of an assured high annual income is the method used by the respondents in distributing their coconut products.

Low annual income may be because of the coconut farmers' reliance on traditional method of distribution and failed to explore more methods. In an interview with coconut farmers, they maintain a regular buyer for their coconut products who visits them during the cropping season.

Number of times to harvest per year is also a factor in determining the method of distribution of products to buyers by the coconut farmers. Lesser number of time to harvest per year would mean a greater volume of production as compared to a more number of harvest every now and then. This would now determine whether the products will be distributed to a wholesaler or a retailer.

Occupation other than coconut farming also determines the method used by the coconut farmers in distributing their coconut products. Farmers who focus least of their time in coconut farming usually do not explore other methods of distribution other than what were traditionally being used. They do not have initiative and not interested to solve problems affecting their income. They are satisfied with small income as an additional source for the income of their profession.

For those farmers who rely so much on their income as a source of their livelihood, there is that strong determination to attain the maximum income thus exerting all their efforts and knowledge in choosing the best method of distribution of their products to the buyers.

Table 7. Relationship between profile of respondents and their mode of selling the coconut products.

Profile	r – value	Probability Value	Remarks
Age	-.211	.000	S
Sex	-.052	.378	NS
Civil status	-.086	.145	NS
Highest Educational attainment	.052	.377	NS

Number of years as coconut farmer	-.125	.033	S
Annual income from coconut farming	.322	.000	S
Land ownership	-.211	.000	S
Land owned	-.052	.378	NS
Number of productive coconut trees	-.086	.145	NS
Average number of nuts per harvest	.052	.377	NS
Times to harvest per year	-.125	.033	S
Occupation other than coconut farming	.322	.000	S

Table 7 shows the relationship between the profile of the respondents to their mode of selling their coconut products.

The variables "age", "number of years as coconut farmer", "annual income from coconut farming", "land ownership", "times to harvest per year", and "their occupation other than coconut farming" have significant relationship with the mode of selling used by coconut farmers.

The number of years for farmers engaged in coconut farming speak much of their experiences in selling their products using different modes to the buyers. This would result to a higher annual income because coconut farmers are already knowledgeable in choosing the best mode of selling, they evade themselves from problems such us difficulty of collection and erroneous small computations of numerable transactions.

Time to harvest per year is also significant in determining the mode of selling their coconut products. As mentioned earlier, lesser number of time to harvest would mean a greater volume of harvest and would require the farmer to choose the best mode of selling to use. Regular harvesting would mean lesser volume of harvest thus an appropriate mode of selling is required.

Occupation other than farming also has a significant relation to the mode of selling. Subject to consider at this point is the time of the farmers spent in the production and distribution of coconut products to the buyers. Respondents who consider coconut farming as sideline or additional income to their earnings in their profession usually do not exert efforts in discovering what mode of selling to be used to give them a higher income as compared to the initiative and discovery ever made by farmers of coconut who depend so much on their income as a source of living.

Table 8. Relationship between profile of respondents and the method used in promoting the product.

Profile	r – value	Probability Value	Remarks
Age	-.093	.113	NS
Sex	.039	.502	NS
Civil status	-.253	.000	S
Highest Educational attainment	-.020	.737	NS
Number of years as coconut farmer	-.038	.520	NS
Annual income from coconut farming	.390	.000	S
Land ownership	-.093	.113	NS
Land owned	.039	.502	NS
Number of productive coconut trees	-.253	.000	S
Average number of nuts per harvest	-.020	.737	NS
Times to harvest per year	-.038	.502	NS
Occupation other than coconut farming	.390	.000	S

The variables "annual income from coco farming"," number of productive coconut trees" and "occupation other than farming" are related to the method used in promoting the product. This may be the case because if the coco farmers own coco farms with only few trees then they will just sell their produce whenever a buyer comes around. They do not mind anymore looking for another method in selling their product.

Those with lower annual income from coco farming will not care promoting the sale of their product through any method other than just sell when a buyer comes.

If the coco farmer has other occupation other coco farming then he has no time to think of other methods to sell their product.

CONCLUSIONS

Based on the above findings, the following conclusions are presented:

As to coconut farmers' profile, annual income from coconut farming and occupation other than coconut farming affect the ways in selling the coconut product. As to coconut farmers' profile, annual income from coconut farming and occupation other than coconut farming affect the method used in determining the price of the product. As to coconut farmers' profile, number of years as coconut farmer, annual income from coconut farming, times to harvest per year and occupation other than coconut farming affect the method used in distributing the product. As to coconut farmers' profile, age, number of years as coconut farmers, annual income from coconut farming, times to harvest per year and occupation other than coconut farming affect the mode of selling the coconut products. As to coconut farmers' profile, annual income from coconut farming, number of productive coconut trees and occupation other than coco-

nut farming affect the method used in promoting the product.

RECOMMENDATIONS

The following recommendations were drawn based from the findings of this study.

Coconut farmers should practice growing of intercrops in coconut lands to generate income not only form coconut fruit but also from other crops.

Coconut farmers must employ methods of promoting the product to make people aware that you are selling such products.

There should be an aggregator or a cooperative that will bring together the farmers and traders and processors on whose behalf will negotiate to both parties especially on the rates of coconuts. This way, there will be a uniform price given to farmers.

The government can also establish an ongoing price for coconut products, e.g., matured coconuts, young coconuts, coconut seedlings, and other by-products, so that there will be a basis on how to price their products competitively.

To increase productivity, it is recommended that coconut farmers undergo replanting and under planting to replace the old, senile, unproductive and disease affected trees.

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HUMAN RESOURCE MANAGEMENT PRACTICES AND JOB SATISFACTION OF EMPLOYEES

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ABSTRACT

This study was conducted to determine the perception of the employees on the human resource management (HRM) practices and the perceived level of job satisfaction of employees of Southern Baptist College, Mlang Cotabato. Also, it sought to provide data with regards to demographic profile of the employees in terms of age, sex, civil status, highest educational attainment, length of service and job classification. Moreover, it also aimed to find out if there is significant difference on the perception of the employees on human resource management practices and the perceived level of job satisfaction when they are grouped according to their profile. Further, the study was also conducted to determine if there is a significant relationship between HRM practices and job satisfaction. Lastly, this study determined which among the HRM practices predict job satisfaction. Using complete enumeration, the respondents composed of seventy (70) fulltime employees of Southern Baptist College were given survey questionnaires to answer. The study revealed that most of employees are female who fall within age bracket of 30 years old and below. Most are college graduate, have been employed for five years and below and serving the institution for 6-10 years. Findings also revealed that there is no significant difference on the perceived level of implementation of HRM practices and Job Satisfaction when grouped according to profile. However, there is a significant difference on the perceived level of job satisfaction in term of operating procedure when employees are grouped by age. Furthermore, findings show high significant relationship between HRM practices and job satisfaction at one percent level. Lastly, findings revealed that among the HRM practices indicators, only recruitment, selection, and performance evaluation were found to be significant predictors of job satisfaction.

Keywords: Human Resource Management Practices, Job Satisfaction

INTRODUCTION

The success of every organization lies on the hand of people working on and for it. Undeniably, human resource is the one of the most indispensable asset of every organization and a source of achieving competitive advantage. Human Resource Management plays a vital role in organizations as they meet various challenges.

Efficient human resource management of highly trained and committed employees of today's flattened, down-sized and high -performing organizations is the result of efficient management of employees. The efficient management of human resources is the competitive key of progressive organizations to be better, faster, more efficient, and ultimately achieve its objectives, mission, and vision (Abasolo & Ruiz 2004).

The primary goal of human resource management in any organization is to facilitate organizational performance, and it is influenced by effective HRM and successful implementation of personnel activities (Mullins, 1999).

The opportunity to select, train, and develop human resource cannot be taken for granted in any educational institutions. They should develop strategies such as selecting the right people, building competencies, providing training, evaluating progress and building positive working relationship (Balatbat, 2010).

Southern Baptist College is a non-profit and Christian institution founded in the year 1952 situated in the municipality of Mlang, Cotabato. This institution was brought by American missionaries with the vision to provide quality Christian education in Mindanao.

To date, the institution faces the challenge of pursuing its vision while making its workers satisfied with their job to efficiently contribute to organizational performance. Being the lifeblood of any organization, it is apparent that human resource management (HRM) has already been practiced by the institution since its conception. However, there was no department which solely and specifically handles the issues and concerns of the employees. Instead, the function of the HRM was delegated into to two committees: first, the Hiring Committee which made up of academic heads and office heads who recruit, select and evaluate its workers; and Personnel Development Committee who serve as the ranking and evaluation board for employees that makes recommendation for the increase in salary and promotion.

Both the administrators and the employees (faculty and non-teaching personnel) acknowledges the need of a human resource manager in the hopes that it can help resolve multiple problems that the institution is currently facing.

The researcher considered the relevance of conducting this study in assessing the following: first, employee's perceived level of implementation of human resource management practices; second, its influence on the employees' perception of the level of job satisfaction; and third, the impact of HRM practices on job satisfaction.

STATEMENT OF THE PROBLEM

The main purpose of the study was to know the perception of the employees on the human resource management practices of Southern Baptist College and the perceived level of job satisfaction of its employees. Specifically, it sought to acquire data pertaining to employees' profile in terms of age, sex, civil status, highest educational attainment, length of service, and job classification. Likewise, it sought to find out the perception of the employees on the human resource management practices in terms of recruitment and selection, training and development, performance evaluation, career development, and employee relations.

Further, the study sought to determine the perceived level of job satisfaction of employees in terms of pay, promotion, supervision, benefits, rewards, operating procedure, co-worker, work itself, and communication.

Significant differences have been probed on the perception of the human resource management practices and job satisfaction of employees when grouped according to profile.

METHODOLOGY

A descriptive correlation method was used in this study. According to Calmorin and Calmorin (2007), correlational research design is a method used to determine the relationship between variables. The study wanted to determine the relationship between perceived level of implementation of the Human Resource Management Practices and the perceived level of Job Satisfaction among the employees of Southern Baptist College. Utilized were primary data taken out from the survey questionnaire gathered from the respondents.

The researcher used survey questionnaire as the main research instrument which was developed to answer the stated problems of the study. It was divided into three parts. The first part of the questionnaire presents the demographic profile of the respondents in term of age, sex, civil status, highest educational attainment, length of service and job classification. The second part was on the HRM practices consisting of 20 items that originated from different authors to measure recruitment and selection, training and development, and career development which was adopted from the study of Benecario (2010), performance evaluation and employee relations was lifted from the study of Balatbat (2010). The third part focused on job satisfaction questionnaire which was developed by Spector (1997). The Likert scale was used to present the choices in the questionnaire. The scales range from 1-5 which means strongly disagree, agree, moderately agree, disagree, and strongly agree, respectively.

Having confidence on the researcher's proximity and accessibility to the respondents, complete enumeration was used. The total full time employees of Southern Baptist College are only 70.

Statistical Treatment

The study used graphical presentation specifically the use of pie charts. These are useful in presenting the respondent's age, sex, civil status, highest educational attainment, length of service and job classification. The perceived level of implementation of HRM Practices and perceived level of job satisfaction of employees was described using mean. In order to determine if there exist significant difference in the perceived level of implementation of HRM Practices and per-

ceived level of job satisfaction when respondents are grouped according to their demographic profile, independent t-test and one-way Analysis of Variance (ANOVA) were used. Furthermore, to determine the relationship between the perceived level of implementation of HRM Practices and perceived level of job satisfaction of employees, Pearson-Product Moment Correlation Coefficient (Pearson-r) was used. Finally, Multiple Regression Analysis was used to determine which among the HRM practices predictors of job satisfaction among employees are.

FINDINGS

Table 1 shows the distribution of respondents based on their socio-demographic profile.

Most of the respondents are within the age bracket of 31-40 (27.1 %), a female (62.9 %), married (64.3%), at most college (68.6 %) and have been employed for five years and below (41.4%).

Table 1 Distribution of respondents by socio-demographic profile

Profile	Frequency	Percentage
Age (years old)		
20-30	25	35.7
31-40	19	27.1
41-50	8	11.4
51-60	14	20.0
61 and above	4	5.7
Total	70	100.0
Sex		
Male	26	37.1
Female	44	62.9
Total	70	100.0
Marital Status		
Single	25	35.7
Married	45	64.3
Total	70	100.0
Highest Educational Attainment		
Almost college	48	68.6
At least master	22	31.4
Total	70	100.0
Length of Service		
below 5 years	29	41.4
6 - 10 years	14	20.0
11 - 15 years	9	12.9
16 - 20 years	5	7.1
21 years and above	13	18.6
Total	70	100.0

Table 2 shows the employees' perception of employees on HRM practices in terms of recruitment and selection, training and development, performance evaluation, career development and employee relations were rated as agree. Also, the overall responses of the employees HRM practices were rated as agree.

Table 2.Summary of perception of employees on the current of Human Resource Management Practices

HRM Practice	Mean	Description
Recruitment and Selection	3.8286	Agree
Training and Development	3.7107	Agree
Performance Evaluation	3.8857	Agree
Career Development	3.8000	Agree
Employee Relations	3.6536	Agree
Over all	3.7757	Agree

Table 3 shows employees' perceived level of job satisfaction in terms of pay, promotion, supervision, benefits, rewards, operating procedure, co-worker, work-itself and communication among respondents were rated as satisfied. Although the operating procedure was rated as moderately satisfied, the overall perception on the employees on the level of job satisfaction is still satisfied.

Table 3.Summary of employees' perceived level of job satisfaction

Job Satisfaction	Mean	Description
Pay	4.0000	Satisfied
Promotion	3.5036	Satisfied
Supervision	4.4000	Satisfied
Benefits	4.2321	Satisfied
Rewards	3.8714	Satisfied
Operating Procedures	3.1821	Moderately Satisfied
Co-Worker	4.3143	Satisfied
Work Itself	4.4964	Satisfied
Communication	4.1429	Satisfied
Over all	**4.0159**	**Satisfied**

Table 4 shows the test of difference on job satisfaction particularly on operating procedures when grouped according to age. The study revealed that there is a significant difference on the perceived level of job satisfaction in terms of operating procedure when employees are grouped by age. The result of this study divulges that employees who belong to age group of o20-30 and 31-40 have lower perception with a mean scores of 3.05 and 2.91 respectively compared to age group of 60 and above with a mean score of 4.06. This result was supported from the study of Herzberg et. al., which theorized that age, has a curvilinear relationship to job satisfaction. As a person begins a job, satisfaction is high. Satisfaction declines for several years, and then begins to rise (as cited in Scott, et al., 2005).

Job Satis-	Age	Mean	F	Signifi-
Operating Procedure	20-30	3.05	2.53*	0.049
	31-40	2.91		
	41-50	3.53		
	51-60	3.34		
	61 and above	4.06		

Table 5 shows the relationship between HRM practices and job satisfaction. The overall correlation index of 0.88 signifies that that there is a high correlation between the independent and dependent variables at p-value is less than 0.05. All of the variables of HRM practices such as recruitment and selection (r=0.742), training and development (r=0.713), performance evaluation (r=0.713), career development (r=0.718) and employees relations (0.763) were found to have high correlation to all dimensions of job satisfaction. This indicates a strong relationship between HRM practices and level of job satisfaction of employees.

Table 5. Correlation between HRM Practices and Job Satisfaction

HRM Practices	Pearson r value	P value
Recruitment and Selection	.742**	0.00
Training and Development	.713**	0.00
Performance Evaluation	.867**	0.00
Career Development	.718**	0.00
Employment Relations	.763**	0.00
Over all	**.883***	**0.00**

***Significant at 0.01 level*

Table 6 shows the test for significant predictors of job satisfaction. Among the HRM practices, only performance evaluation (b=.395, t=8.258, Sig=.008) and recruitment and selection (b=.166, t=2.733, Sig=.000) are significant predictors of job satisfaction of employees. The result can be interpreted as per one percent increase in the perceived level of implementation of performance evaluation, the correspondence .395 percent increase in job satisfaction holding other factors constant. Similarly for every one percent increase in the level of implementation of recruitment and selection practices, there is a corresponding .166 percent increase in the level of job satisfaction holding other factors constant.

The coefficient of multiple determinations (R2) in the job satisfaction can be explained by the independent variables in the study. The remaining 22% can be explained by other factors not in the model.

The F test value of 116.89 which is significant at 0.01 level implies that at least one of the coefficients of the independent variables is significantly different from zero. The results revealed that the coefficient of performance evaluation and recruitment and selection are significantly significant from zero.

Table 6. Test for the Predictors of Job Satisfaction

HRM Practices	Unstandardized Beta Coefficient	t value	Significance
Recruitment and Selection	0.166	2.733**	0.00
Training and Develop-	0.99	1.099 ns	0.276
Performance Evaluation	0.395	8.258**	0.008
Career Development	0.14	1.627 ns	0.108
Employment Relations	0.181	1.970 ns	0.053
Constant	1.846		
R2	0.777		
F test	116.89		
Significance	0.00		

**-significant at .01 level
ns- not significant

CONCLUSIONS

According to Dittmer viewed HRM practices as an individual's perceptions of the extent of the implementation of the strategies, plans, and programs used to attract, motivate, develop, reward, and retain the best people to meet organizational goals. With this, HRM practices comprise specific practices, formal policies, and philosophies that designed to attract, develop, motivate, and retain employees who ensure the effective functioning and survival of the organization (as cited in Hemdi, 2009). The following are the conclusion of the study.

1. Southern Baptist College has acceptable HRM practices even in the absence of HRM department that focused on employees concern for it was as agree by its employees. On the other hand, employees are satisfied with their job.
2. No significant difference on the perception of the employees on HRM practices in terms of recruitment and selection, training and development, performance evaluation, career development and employee relations when employees are grouped according to their profile such as age, sex, civil status, highest educational attainment, length of service and job classification.
3. Also, there is no significant difference on the perceived level of job satisfaction in terms of pay, promotion, supervision, benefits, re-

wards, operating procedure, co-worker, work itself, and communication when employees are grouped according to their profile such as age, sex, civil status, highest educational attainment, length of service and job classification. However, a significant difference exists on employees' perception on the level of job satisfaction in terms of operating procedure when they are grouped according to age. It reveals that employees who belong to age bracket of 61 and above has higher satisfaction compared to respondents who belong to age bracket of 31-40.

4. Moreover, findings of this study concluded that HRM practices have high significant relationship with job satisfaction.
5. Finally, recruitment and selection and performance evaluation were found to be significant predictors of job satisfaction.

RECOMMENDATIONS

In the light of the findings and conclusion of the study, the researcher outlines the following recommendations:

1. The management of SBC may revisit policies on recruitment and selection and device new strategies to attract highly competent and potential employees to be part of the personnel of the school.
2. A systematic performance evaluation has to be in place to provide meaningful job performance feedback to translate job duties into specific performance expectations that will eventually lead to the achievement of the school's vision-mission.
3. The management of SBC may revisit policies on workload management to lessen the overloaded personnel at the same time, salarization plan must in place to provide adequate direction on the pay system of the school so that the employees may have a better appreciation on the plan of the school towards its salary.
4. Employee reward system has to be firmly established to motivate employees at individual and/or group levels.
5. It is high time for the school to hire HR manager to facilitate the human resource management planning to ensure that all HRM practices are implemented properly, and at the same time conduct manpower audit to accurately stress out the needs of the employees and the school which will eventually improve school's performance.
6. Lastly, replication of this study in other institution (both private and public) could be considered to make generalization on the influence of HRM practices in the development of employees' level of job satisfaction.

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SAFETY AWARENESS AMONG FISHERFOLKS IN THE PROVINCE OF ANTIQUE: BASIS FOR SAFETY AWARENESS PROGRAM

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Sibalom, Antique, Philippines

ABSTRACT

This descriptive study aimed at ascertaining the fisherfolks' safety awareness in the Province of Antique as basis for safety awareness program. Utilized for data gathering was researcher-constructed questionnaire on safety awareness. The computer-processed statistics were means, frequency, and rank for descriptive analysis and the t-test for Independent Samples, One-way ANOVA and Stepwise Multiple Regression Analysis for inferential analysis. Alpha level was set at .05. The study found out that generally, fisherfolks' were aware of safety. They had shared five highest safety awareness: they are aware that no disposal of any kind of plastics at sea, they are aware that drowning can threaten the life of fishermen, they are aware that lifesaving equipment can rescue the fishermen, they are aware that rescue team must carry a first aid kit at all time, and they are aware that oil spill can cause pollution and kill marine life. On the other hand, they also shared five least safety awareness: they are aware that self-contained breathing apparatus can be used in enclosed space, they are aware in identifying lifebouys and lighthouse, they are aware in locating safety equipment, they are aware in conducting safety orientation, and they are aware in wearing lifejacket within one minute. Significant differences existed in the fisherfolks' safety awareness when classified according to years in school, years of work experience, and training attended. No significant difference existed in the fisherfolks' safety awareness when classified according to age. Years in school, years of work experience, and training attended were significant predictors of the fisherfolks' safety awareness.

Keywords: Fishing Industry, Maritime Safety, Awareness, Fisherfolks, Province of Antique

INTRODUCTION

Western Visayas is surrounded by vast fishing grounds along the Visayan Sea, Panay Gulf, Cuyo East Pass, and the Sibuyan Sea which contribute greatly to fishing production. A total of 104, 333 fisherfolks registered in Region 6 and one of the highest number of fisherfolks in the country and ranks 4th in the national fisheries production (BFAR Statistics, 2018).

Fishing is still the main sources of food essential to human to survive despite the fact that it remains a hazardous occupation in the world. Every year, the fishing sector experiences a large number of fatalities (ILO, 2017).

Six accidents/incidents occurred on ship below 35 gross tonnage in Panay (MARINA, 2018). In the Philippines as a whole, 585 were caused by capsizing, and 467 were caused by grounding as of 2011 to 2016 (Philippine Coast Guard, 2016).

The Bureau of Fisheries and Aquatic Resources (BFAR) Regional Office 6 has filed the most number of cases on illegal, unreported, unregulated fishing in the country. BFAR has filed 863 cases against fishing operators as of July 2016 to June 2017. Through the concerted efforts of the bureau, 238 cases have been rectified (Philippine Information Agency, 2017).

Ansuya, Majula, and Serrao's (2014) study revealed that safety knowledge/awareness had a significant relationship with safety practices. Rezaee, et al.'s (2016) study showed that extreme environment will increase fishing incident rate.

The Maritime Industry Authority's (MARINA) mission is committed to further enhance the safety of life of passengers' onboard ship and minimize maritime accidents by 25% every year by establishing a Maritime Safety Framework (MARINA Circular No. 2010 – 02).

MARINA Region 6 conducted a mobile Modified Basic Safety Training (MBST) at Estancia,

Iloilo. There were 150 participants who registered for the training. The participants considered the training relevant by helping them respond to any emergency and life-threatening scenarios at sea. They have noted lack of safety equipment and life -saving appliances on their boats.

Fisherfolks' safety is threatened because of the nature of their work and actions must be taken to prevent them from injuries.

Thus, the researcher found it relevant to determine the fisherfolks' safety awareness in the Province of Antique as basis for safety awareness program.

THEORETICAL FRAMEWORK

This research is anchored on Risk Homoeostasis Theory by Wilde (2014) which proposes that in every activity, people accept a level of individual evaluation of risk in terms of their overall safety to enable them to avoid accidents that usually occur at sea due to lack of safety awareness. People ignore risk when the level of risk is below the acceptable limit and increase their exposure to risk. However, when people observe a higher risk, they become aware of precautionary measures to avoid exposure on risk. Thus, people respond on rules, policies, regulations, and new procedures imposed to local authorities.

Thus, there should be a full implementation of safety awareness in fishing industry so that fisherfolks will become fully aware of the danger brought about by negligence and ignorance while working in prone accident environment as fishing.

Figure 1 illustrates in graphic form the paradigm of this research.

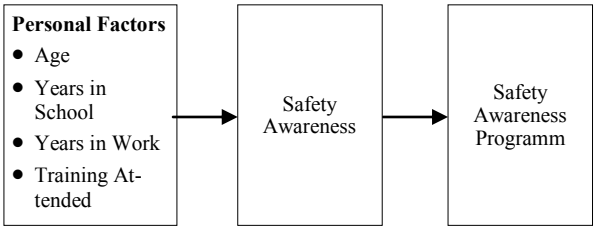

Figure 1. Paradigm of the study

OBJECTIVES OF THE STUDY

The objective of this study was to ascertain the safety awareness among fisherfolks in the Province of Antique. Also, to determine the significant difference in the safety awareness among fisherfolks in the Province of Antique when classified as to categories. Further, to determine the personal factors that best predict safety awareness. Furthermore, to formulate a safety awareness program that will improve the safety awareness of fisherfolks in the Province of Antique.

METHODOLOGY

Research Design

The descriptive method of research was employed in this investigation since the data were collected to answer questions concerning the safety awareness among fisherfolks in the Province of Antique.

Descriptive research, according to Gay, et al. (2009), involves collecting data in order to answer questions concerning the safety awareness among fisherfolks in the Province of Antique. A descriptive research, Gay, et al. add, determines and reports the way things are.

Participants

The participants in this study were the 322 randomly selected fisherfolks in Hamtic, Antique, known as fishing village in the area, from a total registered fisherfolk population of 1, 671 retrieved from the Municipal Fisherfolk Registration System (FishR) Database of Bureau of Fisheries and Aquatic Resources (BFAR) Region 6 as of year 2018.

Simple Random Sampling Technique was used to select the specified number of respondents in Hamtic, Antique, known as fishing village in the area.

Instrument

The data needed for the present research were drawn from a questionnaire-checklist on the safety awareness among fisherfolks constructed by the researcher and duly validated by a jury composed of five members. This instrument was constructed on the basis of the four prescribed modules in Modified Basic Safety Training Course (MBSTC), namely: Elementary First Aid, Personal Survival Technique, Fire Prevention and Fire Fighting, and Personal Safety and Social Responsibility which was developed by the MARINA for the IMO basic safety training course for seafarers' onboard ship below 35 gross tonnage.

All items in the instrument had factor loads of .858 for safety awareness, under the valid constructs intended for the study.

The instrument consisted of two parts: Part I elicited information on the fisherfolks' age, years in school, years of work experience, and training attended. Part II elicited data on the fisherfolks' safety awareness.

Procedure

The researcher requested permission to administer the research instrument from the office of Municipality Mayor of Hamtic, Antique, known as fishing village in the area. The study was conducted in October 2018.

Upon approval of the permit, meticulous oral instructions both in English and Tagalog were given to make certain that the participants accomplished the questionnaires properly.

Data Analysis

The accomplished questionnaires were scored and subjected to appropriate computer-processed statistics using the Statistical Package for the Social Sciences (SPSS) software version 23.

Means, frequency, and rank were the descriptive statistical tools employed in the study. t-test, One-Way ANOVA, and the Stepwise Multiple Regression Analysis set at .05 alpha level were the inferential tools used.

FINDINGS

1. Ranks on the Safety Awareness among Fisherfolks

Table 1 presents the fisherfolks' safety awareness.

The results revealed that the top five highest means on the fisherfolks safety awareness were: they aware that any kind of plastics is not allowed to dispose at sea (M = 3.84), rank 1; they aware that drowning can threaten the life of fishermen during an emergency (M = 3.82), rank 2.5; they aware that lifesaving equipment can rescue the fishermen during emergency (M = 3.82), rank 2.5; they aware that rescue team should carry a first aid kit every time a rescue operation is carried out (M = 3.80), rank 4; and they aware that oil spill can cause pollution and kill marine life (M = 3.79), rank 5. This means that fisherfolks' take good care of marine environment, safety in fishing, and safety of fellow fishermen.

However, the following were least ranked on the fisherfolks' safety awareness were: they aware that self-contained breathing apparatus or SCABA can be used by fire fighters when extinguishing fire in an enclosed space. (M = 1.61), rank 21; they are aware how to identify the lifebouys and lighthouse (M = 1.57), rank 22.5; they are aware how to locate safety equipment and control crew onboard during emergency (M = 1.57), rank 22.5; they are aware how to conduct safety orientation onboard (M = 1.55), rank 24; and they are aware that wearing of lifejacket must be done within a minute only (M = 1.43), rank 25. This means that fisherfolks are deficient on safety equipment and appliances onboard, have no safety information regarding the usage and operation of safety equipment and appliances, lack practice on fire drills, rarely conduct safety awareness program, and lack life-saving appliances available on boat.

This finding supports the result on the study of Ansuya, et al. (2014) which revealed that majority of seafarers had average level of awareness. On the other hand, Rodriguez & Kiran's (2013) study had dissimilar result which showed that the seafarers' overall awareness was inadequate; and Nasab, et al,'s (2009) study which also revealed that majority of seafarers had low level of awareness.

Table 1. Ranks on the Safety Awareness among Fisherfolks

Items I am aware that …	Mean	Description	Rank
drowning can threaten the life of fishermen during an emergency.	3.81	Highly aware	2.5
wearing wet clothes can protect a fisherman from exposure to the hot weather during an emergency.	3.70	Highly aware	9.5
lifesaving equipment can rescue the fishermen during an emergency.	3.81	Highly aware	2.5
lifejacket must be ready and available at all times.	3.67	Highly aware	12
wearing of lifejacket must be done within a minute only.	1.43	Not aware	25
Cardio Pulmonary Resuscitation or CPR can restore the patient's heart pulse.	2.12	Less aware	14
First aid can help eliminate the pain feels by the patient.	3.66	Highly aware	13
Artificial Respiration can restore patient's breathing.	1.84	Less aware	17
proper disposal of cigarette butts can prevent skin burns.	3.70	Highly aware	9.5
unproper use of ship tools can cause severe wounds on skin.	3.68	Highly aware	11
slippery floor can cause bone fracture.	3.74	Highly aware	8
wet blanket is appropriate for extinguishing oil fire.	1.91	Less aware	16
water hydrant can be used to extinguish solid fire.	1.97	Less aware	15

can be extinguished by removing one of these elements such as heat, oxygen and gasoline.	1.79	Less aware	18
foam extiguisher can be used to extinguish liquid fire.	1.77	Less aware	19
rescue team should carry a first aid kit every time a rescue operation is carried out.	3.80	Highly aware	4
self-contained breathing apparatus or SCABA can be used by fire fighters when extinguishing fire in an enclosed space.	1.61	Less aware	21
I am aware how to identify the lifebouys and lighthouse.	1.57	Less aware	22.5
I am aware how to organize safe embarkation or disembarkation of passengers.	1.64	Less aware	20
I am aware how to locate safety equipment and control crew onboard during emergency.	1.57	Less aware	22.5
I am aware how to conduct safety orientation onboard.	1.55	Less aware	24
oil spill can cause pollution and kill marine life.	3.79	Highly aware	5
I am aware proper segregation of wastes onboard.	3.77	Highly aware	7
any kind of plastics are not allowed to dispose at sea.	3.84	Highly aware	1
I am aware that fellowship can create good and harmonious relationship onboard.	3.78	Highly aware	6
Total	**2.78**	**Aware**	

Scale:
1.00 - 1.49 - Not aware
1.50 - 2.49 - Less aware
2.50 - 3.49 - Aware
3.50 - 4.00 - Highly aware

2. Difference in the Fisherfolks' Safety Awareness

Table 2 presents the difference in the fisherfolks' safety awareness when classified according to years in school, years in work, and training attended.

The results revealed that significant difference existed in the fisherfolks' safety awareness when classified according to years in school t(320) = 4.104, years in work experience t(320) = 1.936, and training attended t(320) = 5.495, p < .05. These results imply that personal factors such as years in school, years in work experience, and training attended have influence on the fisherfolks' safety awareness.

Table 2 t-test Results for Difference in the Fisherfolks' Safety Awareness

Category	Mean	t-value	df	2 tail Sig.
Years in school Elementary High school	2.70 2.83	4.104 **	320	.000
Years in work experience Shorter Longer	2.76 2.82	1.936 **	320	.054
Training attended With Without	3.12 2.76	5.495 **	320	.000

*$p < .05$

3. Difference in the Fisherfolks' Safety Awareness When Classified According to Age

Table 3 presents the difference in the fisherfolks' safety awareness when classified according to age.

The results show that no significant difference existed in the fisherfolks' safety awareness when classified according to age F(2,319) = 2.404, p > .05. This result suggests that the fisherfolks, regardless of age, have similar safety awareness.

Table 3 One –Way ANOVA Results in the Differences in the Fisherfolks' Safety Awareness When Classified According to Age

Category	Sum of Squares	df	Mean Squares	F	Sig.
Age					
Between groups	.389	2	.195	2.404	.092
Within groups	25.826	319	.081		
Total	26.215	321			

4. Predictors of the Fisherfolks' Safety Awareness

Data in Table 4 reveal that of the four identified personal factors, training attended, years in school, and years in work experience were found to be significant predictors of the fisherfolks' safety awareness.

As predictors, the obtained R values of training attended, years in school, and years in work experience were R values of .294, .224, and .108, respectively; and R2 values of .086, .050, and.012, respectively. This explains that 8.6%, 5.0%, and 1.2% of the variances in the fisherfolks' safety awareness could be attributed to the training attended, years in school, and years in work experience (Fs = 30.195, 16.845, and 3.748, respectively, p < .05). The results imply that personal factors such as training attended, years in school, and years in work experience play vital roles in the manifested safety awareness of an individual.

On the other hand, age, was not significant predictors of the fisherfolks safety awareness (F=

3.086, p > .05). These results mean that personal factor such as age among fisherfolks has no influence on their safety awareness.

Table 4 Predictors of the Fisherfolks' Safety Awareness

Category	Multiple R	R^2	R^2 Change	F
Age	.098	.010	.010	3.086
Years in school	.224	.050	.050	16.845
Years in work experience	.108	.012	.012	3.748
Training attended	.294	.086	.086	30.195

Category	Sig. F	SEB	BETA	t	Sig.
Age	.000	.039	.098	1.757	.080
Years in school	.307	.130	.224	4.104	.000*
Years in work experience	.054	.063	.108	1.936	.054*
Training attended	.000	.365	.294	5.495	.000*

5. Proposed Safety Awareness Program

"Kaalaman sa Kaligtasan: Karapatan ng mga Mangingisda"

Rationale:

This proposed extension safety awareness program aims to address the problems of the Philippine fishing industry and the existing causes of the problem in order to plan and implement more responsive programs to address key challenges in the fishing industry.

The results of the study revealed that significant differences existed in the safety awareness among fisherfolks in terms of years in school, years in work experience, and training attended. Hence, the results of the study will serve as basis in the formulation of this program objectives and strategies, program priorities to meet the needs of fishing industry which align with the development priorities and commitments of the Philippines government.

The proposed program aims to promote safety awareness; improve financial stability and human capital; improve the health and wellness; and improve the livelihood among fisherfolks in the Province of Antique.

Table 5 presents proposed safety awareness

Program/ Components	Name of Agency	Key Responsibilities
"Kaalaman sa Kaligtasan: Karapatan ng mga Mangingisda" PDP 2017-2022: Ensure safety and Build resilience. United Nations' Sustainable Development Goals (SDG) 2030: SDG 11 – Make cities and human settlement Inclusive, safe, resilient and sustainable. Philippine Transport Plan and Strategy: Transport safety and security concerns. Comprehensive National Fisheries Industry Development Plan (CNFIDP) 2016 – 2020: Inadequate/ inconsistent fisheries policies that promote conducive environment for sustainable development.	Maritime Higher Education Institution Local Government Unit Philippines Coast Guard Maritime Industry Authority	Improve safety awareness of fisherfolks in the Province of Antique PDP 2017-2022: Ensure safety and Build resilience. United Nations' Sustainable Development Goals (SDG) 2030: SDG 11 – Make cities and human settlement Inclusive, safe, resilient and sustainable. Philippine Transport Plan and Strategy: Transport safety and security concerns. Comprehensive National Fisheries Industry Development Plan (CNFIDP) 2016 – 2020: Inadequate/ inconsistent fisheries policies that promote conducive environment for sustainable development.

CONCLUSIONS

The fisherfolks in the Province of Antique believe that they are aware of safety. They shared five highest safety awareness: they aware that any kind of plastics is not allowed to dispose at sea, they aware that drowning can threaten the life of fishermen during an emergency, they aware that lifesaving equipment can rescue the fishermen during emergency, they aware that rescue team should carry a first aid kit every time a rescue operation is carried out, and they aware that oil spill can cause pollution and kill marine life. On the other hand, they also shared five least safety awareness: they aware that self-contained breathing apparatus or SCABA can be used by fire fighters when extinguishing fire in an enclosed space, they are aware how to identify the life-

bouys and lighthouse, they are aware how to locate safety equipment and control crew onboard during emergency, they are aware how to conduct safety orientation onboard, and they are aware that wearing of lifejacket must be done within a minute only. They differ in their level of awareness on safety in the personal factors such as years in school, years of work experience, and training attended. On the other hand, they share similar level of awareness on safety in terms of personal factors as age. They predict their level of awareness on safety in terms of years in school, years of work experience, and training attended that play important role in their manifested safety awareness. The researcher proposed an extension activity titled, "Kaalaman sa Kaligtasan: Karapatan ng mga Mangingisda" to further improve the safety awareness of fisherfolks in the Province of Antique.

RECOMMENDATIONS

It is recommended that the concerned agencies should provide safety information and culture to fisherfolks to further enhance their level of safety awareness before, during, and after fishing activity at sea. Also, Maritime Industry Authority (MARINA) in coordination with local government should provide safety training by providing the fisherfolks with modified basic safety training (MBST) courses. Further, concerned agencies should provide the fisherfolks with safety equipment to be used during their fishing activity at sea. These recommendations are aligned with the national and international policies on PDP 2017-2022, United Nations' Sustainable Development Goals (SDG) 2030, Philippine Transport Plan and Strategy, and Comprehensive National Fisheries Industry Development Plan (CNFIDP) 2016 – 2020.

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TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE COMPETENCIES: BASES FOR TRAINING CURRICULUM DESIGN FOR DENTISTRY FACULTY

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ABSTRACT

The study aimed to evaluate the Technological, Pedagogical, and Content, and Knowledge competencies of the faculty members of the School of Dentistry handling dental professional courses of a School of Dentistry Manila, Philippines. Because TPACK is becoming an increasingly important construct in the field of dental education, the author necessitates mechanisms to capture teachers' development of this portion of the knowledge base for effective teaching and learning. Knowledge, both theoretically and in practice as what the curriculum in Dentistry carries, produces the types of flexible knowledge needed to successfully integrate TPACK into teaching and learning. Adopting the descriptive method via the quantitative approach, validated questionnaires were given to the entire 110 faculty respondents in the four campuses. The faculty respondents were selected via purposive sampling based on the inclusion criteria. The faculty members' competencies in TPACK on dental professional courses from the said School of Dentistry were obtained through self-assessment questionnaires. Informal interviews were also conducted to substantiate the results from the questionnaires. To describe the characteristics of the faculty respondents, the frequency and percentage distribution were utilized. With regard to the assessment of the competencies of the faculty handling dentistry courses in TPACK, the mean and standard deviation were employed. Lastly, to compare the responses of the faculty respondents in the various competencies of TPACK, the Analysis of Variance (ANOVA) was used. All the data were subjected to appropriate statistical measures using the Statistical Package for Social Sciences (SPSS) Version 21 .

Keywords: TPACK, Technological, Pedagogical, Content Knowledge, Competencies, Teaching and Learning Enhancement, Faculty Members

INTRODUCTION

Teaching at its most literal level is educating. Imparting knowledge is the most fundamental part of a teacher's job. It is more evident than inspiring, motivating and forming relationships. Teachers are representatives of the curriculum which directly affect the students. Just like many other elements of the job, the act of teaching is influenced by its general principles and the teacher's own pedagogy and management strategies used for instructions. It is undeniable that the teachers' knowledge of pedagogy and content is essentially important. However, technological advancement is increasingly playing important roles in educational practices in which technology, such as chalks, blackboards, and markers in more traditional innovations, or computers, iPods and smart phones in more advanced innovations, have come to the classrooms. This reality requires teachers to integrate or adopt technology into the classrooms for better educational practices as an additional capacity to their knowledge in pedagogy and content knowledge. Therefore, a teacher should possess the three domains of the teachers' knowledge.

In particular, three domains of knowledge include Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), or the so-called TPACK for they become the core components of the teacher knowledge and are considered fundamental for effective instructional practices. Through recent years, the phrase "Technological, Pedagogical and Content Knowledge" (or Technology, Pedagogy, and Content Knowledge or TPACK) has been

used to describe "an understanding that emerges from an interaction of content, pedagogy, and technology knowledge" (Mishra & Koehler, 2009). Such conceptualization emphasizes that TPACK is more than just the sum of its parts. It is a framework to describe the kinds of knowledge needed by a teacher in order to implement effective pedagogy in a technology enhanced learning environment. Teacher knowledge is emphasized as the teacher is viewed as an autonomous agent with the power to significantly influence the appropriate or even the inappropriate integration of technology in teaching. In Dentistry, it implies that the faculty must engage with content, pedagogy, and technology in tandem to develop the knowledge of how technology can help students learn specific dental concepts.

TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies as well as adopting pedagogical techniques that utilize technologies in constructive ways to teach content. Moreover, it pertains to the knowledge of what makes concepts difficult or easy to learn and how technology can help solve some of the problems that students face. By simultaneously integrating the knowledge of technology, pedagogy and content, teachers bring TPACK into the classroom any time they teach. Thus, teachers need to develop fluency and cognitive flexibility not just in each of the key domains (T, P, and C), but also in the manner in which these domains and contextual parameters interrelate, so that they can construct effective solutions. This is the kind of deep, flexible, pragmatic, and nuance understanding of teaching when technology is involved in considering TPACK as a professional knowledge construct (Groth, Spickler, Bergner & Bardzell, 2009). Teachers are still doing the traditional and conventional way of teaching; hence, the researcher shall examine the Technological, Pedagogical and Content Knowledge (TPACK) competencies of the faculty members in Centro Escolar University School of Dentistry's four campuses in-charge of dentistry courses.

STATEMENT OF THE PROBLEM

The study aimed to evaluate the Technological, Pedagogical, and Content, and Knowledge TPACK competencies of the faculty members of the School of Dentistry handling dental professional courses.

More specifically, it sought answers to the following questions:

1. What are the characteristics of the faculty respondents according to:
   1.1 Age
   1.2 Highest Educational Attainment
   1.3 Number of Years Teaching Experience?
2. What are the competencies demonstrated by the faculty handling clinical dentistry courses in terms of the following variables:
   2.1 Technological Knowledge (TK)
   2.2 Pedagogical Knowledge (PK)
   2.3 Content Knowledge (CK)
   2.4 Pedagogical Content Knowledge (PCK)
   2.5 Technological Pedagogical Knowledge (TPK)
   2.6 Technological Content Knowledge (TCK)
   2.7 Technological, Pedagogical, and Content Knowledge (TPACK)?
3. How do the responses of the respondents compare when grouped according to their aforementioned characteristics?
4. What training curriculum design may be proposed to address the enhancement of the Technological Pedagogical and Content Knowledge (TPACK) competencies among the Dentistry faculty respondents?

METHODOLOGY

The study utilized the descriptive quantitative and informal interview approaches of investigation in gathering the relevant data needed to answer the problems of the study. The data collected for the descriptive research showed a number of advantages as it can offer a very multifaceted approach. Descriptive method was able to provide the researcher the opportunity to use quantitative data in order to discover data and characteristics about the population or phenomenon that is being studied.

The study includes a research grid which highlights the research items subjected for investigation, respondents' information, relevant variables, instruments and statistical analysis as well as tools that pertain to the entire investigation.

A Table of Specifications (TOS) on the number of items regarding Faculty Respondents' profile and their competencies on TK, PK, CK, PCK, TPK, TCK and TPACK for the following dentistry courses: Oral Diagnosis, Orthodontics, Pediatric Dentistry, Restorative Dentistry, Endodontics, Periodontics, Prosthodontics and Oral Surgery

was also crafted to ensure the content validity of the instrument.

FINDINGS AND DISCUSSIONS

1. Profile of the Respondents

The respondents included all the 155 faculty members who were teaching Dentistry proper handling clinical dentistry professional courses from the four campuses of Centro Escolar University namely Manila, Malolos, Makati and Las Piñas respectively at the time of study. Respondents also included the chief of clinics and clinical section coordinator of each specialization of the dentistry department.

Characteristics of the Faculty Respondents

1.1 Age

Table 1. Age of the Respondents

Age	Frequency	Percentage (%)
20-25	6	5.50
26-31	21	19.10
32-37	8	7.30
38-43	11	10.00
44-49	15	13.60
50 and above	49	44.50
TOTAL	110	100

As seen in Table 1, 49 (44.5%) of the faculty respondents fell under the age bracket of 50 years old and above while the least in number were the 6 (5.5%) of them with ages 20-25 years old. Age plays a significant implication in the use of TPACK especially in Pedagogical and Content Knowledge.

1.1.1 Faculty Respondents per CEU Campus

Table 2. Faculty Respondents per CEU Campus

Campuses	Actual Number of Faculty Members	No. of Faculty Respondents
Manila	118	82
Makati	17	14
Malolos	15	10
Las Piñas	5	4
Total	155	110

To evaluate the teaching competencies of the faculty members, the standardized TPACK questionnaire by Schmidt and Mishra based on Shulman's idea of TPACK was modified to suit the faculty respondents (FR) of the CEU School of Dentistry. Seventy (70) items composed the modified TPACK questionnaire and was administered to 10 faculty members for validation while 20 faculty members for reliability test were considered. An informal interview was conducted among selected respondents to supplement data gathering and statistical treatment to verify pertinent information and to corroborate the findings substantially.

After the validity and reliability tests, 60-item tests were designed to assess the competencies of the faculty about TPACK. The final questionnaire was adapted from TPACK by Schmidt and Mishra (2009) but modified by the researcher to suit its target respondents – the dentistry faculty. It was divided into sub topics or items namely technological, pedagogical and content knowledge. A Table of Specifications (TOS) was likewise prepared to assure that all the topics to be assessed were represented in the test for content validity. In addition, the expertise of the 10 faculty experts was sought to validate the items. Technological Knowledge (TK) have 7 items while the Pedagogical Knowledge (PK) is composed of 7 items. Moreover, the Content Knowledge (CK) is comprised of 24 items. Further, Pedagogical Content Knowledge (PCK) is composed of 1 item while the Technological Pedagogical Knowledge (TPK) has 9 items; Technological Content Knowledge (TCK) has 1 item, and finally, the Technological Pedagogical and Content Knowledge (TPACK) is composed of 7 items respectively. Courses were classified according to the different dentistry professional courses namely, (1) Oral Diagnosis, (2) Orthodontics, (3) Pediatric Dentistry, (4) Restorative Dentistry, (5) Endodontics, (6) Periodontics, (7) Prosthodontics; and (8) Oral Surgery.

The data obtained in the questionnaire were processed accordingly while the responses from the interviews were analyzed to establish and corroborate the validity of the entire investigation.

The draft of the questionnaire was initially submitted to the dissertation adviser for correction, comments and suggestions. Expert validation of the questionnaire followed.

Meanwhile, around 20 faculty members of the CEU School of Dentistry participated in the dry run of the instrument to establish the reliability of the questionnaire. All these faculty members were excluded in the actual administration of the instrument.

Table 2. Highest Educational Attainment (HEA) of the Respondents

HEA	Frequency	Percentage (%)
DMD	16	14.50
MA/MS	36	32.70
Ph.D.	36	32.70
On-going MA/MS	16	14.50
On-going Ph.D.	6	5.50
TOTAL	110	100

1.2 Highest Educational Attainment

All the 110 faculty respondents FR passed the Dentist's Licensure Examination.

As depicted in Table 2, 36 (32.7%) of the FR fell under the MA/MS/Ph.D. bracket of highest educational attainment while the least in number were the 6 (5.5%) of the respondents who belonged under on-going Ph.D. This profile corroborates with the description in Teacher Education for Specific Levels and Methods (2019). Evidently, a master's degree is the minimum level of education required to be a college instructor in higher educational institutions. Those interested in pursuing a career in this field should seek opportunities to acquire teaching experience and may be required to complete a doctoral degree.

Highest Educational Attainment has implications in TPACK with regard to Pedagogical and Content Knowledge of the FR.

1.3 Years of Teaching Experience

Teaching experience is positively associated with student achievement gains throughout a teacher's career. Gains in teacher effectiveness associated with experience are most steep in teachers' initial years but continue to be significant as teachers reach the second, and often third decades of their careers.

As exhibited in Table 3, 59 (53.6%) of them fell under the 21 years and above teaching experience while the least in number consisted of the 2 (1.8%) of the respondents with 11-15 years of teaching experience.

Table 3.Years of Teaching Experience of the Respondents

Years of Teaching Experience	Frequency	Percentage (%)
1-5	31	28.20
6-10	11	10.00
11-15	2	1.80
16-20	7	6.40
21 and above	59	53.60
TOTAL	110	100

2. Competencies of the Faculty Respondents Handling Dentistry Courses

2.1 Technological Knowledge

It refers to the teacher's capacity to appropriately select and use technology that best supports and promotes effective instruction. This capacity allows teachers to integrate technology into their classrooms in which teachers can benefit technology for their own classroom practices. This knowledge also requires teachers' skills to operate technology they use.

Table 4. Competencies of the Faculty Respondents Handling Dentistry Courses in Terms of Technological Knowledge (TK)

Technological Knowledge (TK)	Mean	Standard Deviation	Verbal Interpretation
I can learn technology easily. I know how to solve my own technical problems	3.29	0.70	Agree
I keep up with important new technologies.	3.28	0.70	Agree
I frequently play around the technology.	3.15	0.67	Agree
I have had sufficient opportunities to work with different technologies.	3.15	0.70	Agree
I have the technical skills I need to use technology.	3.06	0.66	Agree
I know how to solve my own technical problems.	3.00	0.74	Agree
I know about a lot of different technologies.	2.93	0.72	Agree
OVERALL	3.12	0.57	Agree

As viewed in Table 4, the faculty respondents unanimously *agreed* that they possess Technological Knowledge (TK) as evidenced by an overall mean of 3.12 with a standard deviation of 0.57. Specifically, they *agreed* that "they can learn technology easily" (Mean=3.29; SD=0.70) while a few of them *agreed* that "they know about a lot of different technologies" (Mean=2.93; SD=0.72).

The findings reveal that technology knowledge is evident among the faculty respondents due to their exposure in the various gadgets available in their environment particularly at home.

2.2 Pedagogical Knowledge

Pedagogical Knowledge includes generic knowledge about how students learn, teaching approaches, methods of assessment and knowledge of different theories about learning.

Table 5 Competencies of the Respondents Handling Dentistry Courses in Terms of Pedagogical Knowledge (PK)

Pedagogical Knowledge (PK)	Mean	Standard Deviation	Verbal Interpretation
I know how to assess student performance in a classroom.	3.71	0.66	Strongly Agree
I can adapt my teaching based upon what students currently understand or do not understand.	3.66	0.52	Strongly Agree
I know how to organize and maintain classroom management.	3.62	0.54	Strongly Agree

Pedagogical Knowledge (PK)	Mean	Standard Deviation	Verbal Interpretation
I can adapt my teaching style to different learners.	3.59	0.54	Strongly Agree
I can assess student learning in multiple ways.			
I can use a wide range of teaching approaches in a classroom setting.	3.51	0.57	Strongly Agree
I am familiar with common student understanding and misconceptions.	3.46	0.58	Agree
OVERALL	3.59	0.45	Strongly Agree

Table 5 exhibits the FR handling Dentistry courses' agreement on Pedagogical Knowledge (PK).

As seen therein, the respondents unanimously strongly agreed that they possess Pedagogical Knowledge (PK) as evidenced by an overall mean of 3.59 with a standard deviation of 0.45. Specifically, they strongly agreed that "they can assess student performance" in the classroom (Mean=3.71; SD=0.66) while a few of them agreed that "they are familiar with common student understanding and misconceptions" (Mean=3.46; SD=0.58).

The findings reveal that pedagogical knowledge is evident among the faculty respondents due to the high number of years in teaching experience.

2.3 Content Knowledge

Content Knowledge is the knowledge about actual subject matter that is to be learned or taught. Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas

Table 6 Summary of Content Knowledge (CK) Competencies

Content Knowledge	Overall Mean	Standard Deviation	Verbal Interpretation
Oral Diagnosis	3.64	0.42	Strongly Agree
Orthodontics	3.79	0.34	Strongly Agree
Pediatric Dentistry	3.62	0.45	Strongly Agree
Restorative Dentistry	3.76	0.38	Strongly Agree
Endodontics	3.66	0.43	Strongly Agree
Periodontics	3.54	0.62	Strongly Agree
Prosthodontics	3.79	0.36	Strongly Agree
Oral Surgery	3.55	0.47	Strongly Agree

As seen in Table 6, the respondents unanimously *strongly agreed* that they possess Content Knowledge (CK) in Oral Diagnosis, as evidenced by an overall mean of 3.64 with a standard deviation of 0.42. The respondents also unanimously and *strongly agreed* that they possess Content Knowledge (CK) in Orthodontics, as evidenced by an overall mean of 3.79 with a standard deviation of 0.34. The respondents likewise unanimously and *strongly agreed* that they possess Content Knowledge (CK) in Pediatric Dentistry, as evidenced by the overall mean of 3.62 with a standard deviation of 0.45. The results of Table 8 revealed that majority of the respondents *strongly agreed* that they possess Content Knowledge (CK) in Restorative Dentistry, as evidenced by an overall mean of 3.76 with a standard deviation of 0.38. The respondents *strongly agreed* that they possess Content Knowledge (CK) in Endodontics, as supported by an overall mean of 3.66 with a standard deviation of 0.43. The respondents truly exhibit Content Knowledge (CK) in Periodontics based on the overall mean of 3.54 with a standard deviation of 0.62. As depicted in Table 8, the respondents *strongly agreed* that they possess Content Knowledge (CK) in Prosthodontics based on the overall mean of 3.79 with a standard deviation of 0.36. The majority of the respondents *strongly agreed* that they possess Content Knowledge (CK) in Oral Surgery as suggested by the overall mean of 3.55 with a standard deviation of 0.47.

Table 7. Competencies of the Faculty Respondents Handling Dentistry Courses in Terms of Content Knowledge (CK) in specific dentistry professional courses

Content Knowledge (CK)	Mean	Standard Deviation	Verbal Interpretation
Oral Diagnosis	3.64	0.42	Strongly Agree
I can use an analytical, comprehensive and systematic way of thinking.	3.73	0.45	Strongly Agree
I have various ways and strategies of developing my understanding on the compilation and study of the patient's dental history and a detailed clinical examination of the oral tissues and radiographs.	3.66	0.47	Strongly Agree
I have sufficient scientific knowledge to identify oral diseases processes and distinguish one disease from another.	3.55	0.50	Strongly Agree
Orthodontics	3.79	0.34	Strongly Agree
I have various ways and strategies of developing my understanding concerning diagnosis and treatment of dental deformities as well as irregularity in the relationship of the lower to the upper jaw.	3.89	0.32	Strongly Agree

Content Knowledge (CK)	Mean	Standard Deviation	Verbal Interpretation
I have sufficient knowledge about the treatment of irregularities in the teeth (especially of alignment and occlusion) and jaws including the use of braces.	3.78	0.42	Strongly Agree
I can use an analytical and holistic type of thinking.	3.72	0.46	Strongly Agree
Pediatric Dentistry	3.62	0.45	Strongly Agree
I can use and analytical and holistic type of thinking	3.66	0.48	Strongly Agree
I have sufficient knowledge about preventive and therapeutic oral health care for infants and children through adolescence, including those with special health care needs.	3.62	0.50	Strongly Agree
I have various ways and strategies of dealing with care and treatment of children's teeth.	3.59	0.50	Strongly Agree
Restorative Dentistry	3.76	0.38	Strongly Agree
I have sufficient knowledge about the diagnosis and integrated management of diseases of the teeth and their supporting structures and the rehabilitation of the dentition to functional and aesthetic requirements of an individual.	3.76	0.43	Strongly Agree
I can use critical and comprehensive way of thinking.	3.76	0.43	Strongly Agree
I have various ways and strategies of developing my understanding of the restoration of a diseased, injured, or abnormal teeth to normal function.	3.76	0.43	Strongly Agree
Endodontics	3.66	0.43	Strongly Agree
I have sufficient knowledge about the cause, diagnosis, prevention and treatment of diseases of the dental pulp and periapical tissues.	3.73	0.45	Strongly Agree
I can use a constructive, creative and critical-analytic type of thinking.	3.64	0.49	Strongly Agree
I have various ways and strategies of developing my understanding on the removal of the dental pulp and other tissue of the pulp cavity, cleaning and shaping the root canal, and its replacement with suitable filling material.	3.64	0.49	Strongly Agree
Periodontics	3.54	0.62	Strongly Agree
I have sufficient knowledge with the diseases of the supporting and investing structures of the teeth including the gingiva, cementum, periodontal ligaments and alveolar bone.	3.62	0.65	Strongly Agree
I can use critical, analytical and comprehensive way of thinking.	3.53	0.66	Strongly Agree
I have various ways and strategies that focus on the inflammatory diseases that destroy the gingiva and other supporting structures around the teeth.	3.50	0.66	Strongly Agree
Prosthodontics (FPD RPD CD)	3.79	0.36	Strongly Agree
I have various ways and strategies of developing my understanding on the making of artificial replacements for missing parts of the mouth and jaw.	3.80	0.40	Strongly Agree
I can use science and critical way of thinking as guide for clinical decision-making.	3.78	0.41	Strongly Agree
I have sufficient knowledge about the restoration and maintenance of oral function by the replacement of missing teeth and other oral structures by artificial devices.	3.78	0.41	Strongly Agree
Oral Surgery	3.55	0.47	Strongly Agree
I can use critical, comprehensive and procedural way of thinking.	3.66	0.55	Strongly Agree
I have various ways and strategies of developing my understanding of conditions of the jaws and mouth structures requiring surgical intervention.	3.52	0.50	Strongly Agree
I have sufficient knowledge about the diagnosis and treatment of oral conditions requiring surgical interventions.	3.48	0.57	Strongly Agree
OVERALL	3.71	0.42	Strongly Agree

The findings reveal that content knowledge is evident among the faculty respondents handling Oral Diagnosis courses, possibly due to their number of years in teaching experience and training.

Content Knowledge (CK) in Orthodontics

As viewed in Table 7, the respondents unanimously and strongly agreed that they possess Content Knowledge (CK) in Orthodontics, as evidenced by an overall mean of 3.79 with a standard deviation of 0.34. Specifically, they strongly

agreed that "they can use various ways and strategies of developing their understanding concerning diagnosis and treatment of dental deformities as well as irregularities in the relationship of the lower to the upper jaw" (Mean=3.89; SD=0.32) while a few of them strongly agreed that "they can use an analytical and holistic type of thinking" (Mean=3.72; SD=0.46). The findings reveal that content knowledge is evident among the faculty respondents handling Orthodontics courses, due to their number of years in teaching experience.

Table 8 Competencies of the Respondents Handling Dentistry Courses in Terms of Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Knowledge (TPK)	Mean	Standard Deviation	Verbal Interpretation
1. I can choose technologies that enhance the teaching approaches for a particular lesson.	3.56	0.61	Strongly Agree
2. I can choose technologies that enhance my students learning for a lesson.	3.49	0.64	Agree
3. I am thinking critically about how to use technology in my classroom.	3.45	0.60	Agree
4. I can select technologies to use in my classroom that enhance how I teach and what students learn.	3.44	0.58	Agree
5. I can use strategies that combine technologies and teaching approaches that I learned about in my coursework in my classroom.	3.44	0.55	Agree
6. I can choose technologies that enhance how I teach for a lesson.	3.44	0.61	Agree
7. I can adapt the use of the technologies that I am learning about to different teaching activities.	3.43	0.59	Agree
8. I can provide leadership in helping others to coordinate the use of technologies and teaching approaches at my school and/or section.	3.31	0.63	Agree
9. My former dentistry professors in dental school, has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.	2.95	0.97	Agree
OVERALL	3.38	0.50	Agree

As viewed therein, the respondents only agreed that "they possess Technological Pedagogical Knowledge (TPK)", as evidenced by an overall mean of 3.38 with a standard deviation of 0.50. Specifically, they strongly agreed that "they can choose technologies that enhance the teaching approaches for a particular lesson" (Mean=3.56; SD=0.61) while a few of them agreed "that their former dentistry professors in dental school, has caused them to think more deeply about how technology could influence the teaching approaches they used in their classroom" (Mean=2.95; SD=0.97). The findings indicate that technological, pedagogical knowledge is not that much evident among the faculty respondents handling Dentistry courses, due to their number of years in teaching experience.

Table 9 Competencies of the Respondents Handling Dentistry Courses in Terms of Technological, Pedagogical and Content Knowledge (TPACK)

Technological Pedagogical and Content Knowledge (TPACK)	Mean	Standard Deviation	Verbal Interpretation
1. I can teach lessons that appropriately combine clinical dentistry courses and teaching approaches.	3.45	0.56	Agree
2. I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom.	3.43	0.56	Agree
3. I can choose technologies that enhance the content for a lesson.	3.43	0.58	Agree
4. I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn.	3.43	0.56	Agree
5. I can teach lessons that appropriately combine dental literacy, technologies and teaching approaches.	3.38	0.62	Agree
6. I can teach lessons that appropriately combine the pre-clinical courses, technologies and teaching approaches.	3.35	0.59	Agree
7. I can provide leadership in helping others coordinate the use of content technologies and teaching approaches at my school and/or section.	03.23	0.63	Agree
OVERALL	3.38	0.50	Agree

Table 9 illustrates the faculty respondents handling Dentistry courses' agreement on Technological, Pedagogical and Content Knowledge (TPACK).

As stated in Table 9, the respondents unanimously agreed that they possess Technological, Pedagogical and Content Knowledge (TPACK) in Dentistry courses, as evidenced by an overall mean of 3.38 with a standard deviation of 0.50.

Particularly, they agreed "that they can teach lessons that appropriately combine clinical dentistry courses technologies and teaching approaches" (Mean=3.45; SD=0.56) while a few of them agreed that "they can provide leadership in helping others coordinate the use of content, technologies, and teaching approaches at their school and/or section" (Mean=3.23; SD=0.63). The findings reveal that technological, pedagogical and content knowledge is evident among the faculty respondents handling Dentistry courses, possibly due to their number of years in teaching experience.

Undeniably, the respondents composed of various age levels, educational attainment and years of experience among others articulated a wide-range of responses with regard to TPACK.

Though most of them expressed their possession of knowledge and skills with regard to TPACK, they managed to air their concerns with regard to the availability of technology.

Table 10. TPACK Competencies of the Respondents Handling Clinical Dentistry Courses

Technological Pedagogical and Content Knowledge (TPACK) Competencies	Mean	Standard Deviation	Verbal Interpretation
Pedagogical Content Knowledge (PCK)	3.69	4.64	Strongly Agree
Pedagogical Knowledge (PK)	3.59	0.45	Strongly Agree
Technological Content Knowledge (TCK)	3.41	0.57	Agree
Table 13 continued			
Technological Pedagogical Knowledge (TPK)	3.38	0.50	Agree
Technological Pedagogical and Content Knowledge (TPACK)	3.38	0.50	Agree
Technological Knowledge (TK)	3.12	0.57	Agree
OVERALL	3.47	0.34	Agree

As viewed in Table 10, the respondents strongly articulated that they possess Technological Pedagogical and Content Knowledge (TPACK) in Dentistry courses, as evidenced by an overall mean of 3.47 with a standard deviation of 0.34. Specifically, they admitted that "they possess competencies in Technological Content Knowledge TCK" with a mean of 3.41 and a standard deviation of 0.57 while a few of them agreed that "they possess competencies in Technological Knowledge (TK)" based on the mean of 3.12 with a standard deviation of 0.57. The findings reveal that the Pedagogical Content Knowledge or PCK is evident among the faculty respondents handling Dentistry courses, possibly due to their number of years in teaching experience.

Moreover, it also discusses that the best practices for teaching particular content to their specific students are embodied in PCK. As expected, Dentistry faculty follows the best practices in teaching dental professional courses deemed applicable to the dentistry students.

On the other hand, the low level of agreement in Technological Knowledge or TK (Mean=3.12; SD=0.57) complemented the study of Stein et al. (2014). Although the majority of students might consider themselves to be very skilled at using information technology, many faculty members would claim the opposite when evaluating their own knowledge and skills with regard to the utilization of technology.

3. Comparison of the Faculty Respondent's Answers when Grouped According to their Demographic Profile

3.1 Comparison of the TPACK Competencies of the Faculty Respondents when Grouped According to Age

Table 11. Comparison of the Faculty Respondents' Responses on their TPACK Competencies when Grouped According to their Age

		Mean	S.D.	F-value	p-value	Sig	Remarks (Post Hoc)
TK	20-25	3.59	0.52	4.43	P = 0.001 < 0.01	S	20-25 VS 44-49, 50 and above 26-31 VS 50 and above 32-37 VS 44-49, 50 and above 38-43 VS 50 and above
	26-31	3.32	0.41				
	32-37	3.50	0.38				
	38-43	3.32	0.49				
	44-49	2.98	0.37				
	50 and above	2.91	0.63				
	Total	3.12	0.57				
PK	20-25	3.64	0.39	2.31	P = 0.049 < 0.05	S	26-31 VS 44-49, 50 and above
	26-31	3.33	0.39				
	32-37	3.42	0.38				
	38-43	3.61	0.38				
	44-49	3.66	0.40				
	50 and above	3.69	0.49				
	Total	3.59	0.45				
CK	20-25	3.72	0.30	3.17	P = 0.010 < 0.05	S	50 and above VS 26-31, 38-43, 44-49
	26-31	3.59	0.37				
	32-37	3.61	0.40				
	38-43	3.60	0.38				
	44-49	3.47	0.80				
	50 and above	3.87	0.22				
	Total	3.71	0.42				

		Mean	S.D.	F-value	p-value	Sig	Remarks (Post Hoc)
PCK	20-25	3.83	0.40	5.18	P = 0.000 < 0.01	S	20-25VS 26-31 26-31 VS 38-43, 44-49, 50 and above
	26-31	3.29	0.46				
	32-37	3.63	0.51				
	38-43	3.73	0.46				
	44-49	3.73	0.45				
	50 and above	3.84	0.37				
	Total	3.69	0.46				
TPK	20-25	3.57	0.26	= 0.54	P = 0.745 > 0.05	NS	
	26-31	3.26	0.38				
	32-37	3.47	0.43				
	38-43	3.38	0.38				
	44-49	3.48	0.38				
	50 and above	3.37	0.63				
	Total	3.38	0.50				
TCK	20-25	3.83	0.40	0.96	P = 0.446 > 0.05	NS	
	26-31	3.33	0.48				
	32-37	3.38	0.51				
	38-43	3.36	0.50				
	44-49	3.27	0 .59				
	50 and above	3.45	0.64				
	Total	3.41	0.57				
TPACK	20-25	3.64	0.35	0.41	P = 0.834 > 0.05	NS	
	26-31	3.33	0.38				
	32-37	3.46	0.39				
	38-43	3.32	0.37				
	44-49	3.38	0.47				
	50 and above	3.37	0.60				
	Total	3.38	0.50				

3.1.1 Technological Knowledge (TK)

Tabular value shows that the perceptions of the respondents were found mostly to have a significant difference in the domains of the TK as shown by the p-value which is all less than 0.01.

Considering the results of the mean for the TK domain according to age, ages 20-25 were found to have a significant difference with a highest mean of 3.59 with a standard deviation of 0.52. Looking at the obtained mean, ages 50 and above garnered the lowest (Mean=2.91; SD=0.63). This implies that respondents who are 20-25 years old are more technologically knowledgeable than the other groups. The age of the respondents resulted to significant difference with regard to TK among 20-25 years old compared with the age groups of 44-49 as well as 50 and above; 26-31 years old compared to 50 years old and above; 32-37 years of age compared with 44-49 years old as well as 50 years old and above and ages 38-43 compared with the age groups of 50 years old and above. Evidently, age was found to have a significant difference as it garnered an overall mean of 3.12 with a standard deviation of 0.57. Ages 20-25 years old has the highest agreement among age levels with regard to TK.

3.1.2 Pedagogical Knowledge (PK)

Considering the results of the mean for the Pedagogical Knowledge domain, ages 50 and above were found to have a very significant difference which emerged as the highest (Mean=3.69; SD=0.49). However, looking at the obtained mean, ages 32-37 recorded the lowest (Mean=3.33; SD=0.39). This implies that respondents who are 50 years of old and above are more pedagogically knowledgeable than the other groups. The age of the respondents resulted to a significant difference with regard to PK in the age groups of 26-31 in favor of faculty respondents ages 44-49 and 50 and above. Hence, age was found to have a very significant difference with an overall mean of 3.59 with a standard deviation 0.45.

3.1.3 Content Knowledge (CK)

Tabular value indicates that the perceptions of the respondents were found to have a significant difference in the domains of the CK as shown by the p-value which is less than 0.05.

Considering the results of the mean for the Content Knowledge domain, age bracket of 50 years and above was found to have a significant difference based on the highest rating (Mean=3.87; SD=0.22). Looking at the obtained mean, ages 44-49 got the lowest (Mean=3.47; SD=0.80). This implies that respondents who are 50 years of old and above are more knowledgeable in content knowledge than the other groups. Essentially, age of the respondents resulted to a significant difference with regard to CK in favor among respondents with ages 50 and above as compared with ages 26-31, 38-43, 44-49 respectively. Meanwhile, CK resulted to a significant difference with regard to age with an overall mean of 3.71 with a standard deviation of 0.42.

3.1.4 Pedagogical Content Knowledge (PCK)

Tabular value reveals that the perceptions of the respondents were found to have a very significant difference in the domains of the PCK as shown by the p-values which is less than 0.01.

Considering the results of the mean for the Pedagogical Content Knowledge domain, the age groups of 50 and above were found to have a significant difference with a highest (Mean=3.84; SD=0.37). Meanwhile, looking at the obtained mean, ages 26-31 garnered the lowest (Mean=3.29; SD=0.46). This implies that the el-

derly respondents such as those who belonged in the 50 years of old and above are more equipped with the Pedagogical Content Knowledge than the other groups. In particular, the age of the respondents resulted to a significant difference with regard to PCK among ages 20-25 compared with ages 26-31. In the same manner, respondents with ages 26-31 resulted to a significant difference compared with those ages 38-43, 44-49 and 50 and above respectively. Overall, PCK resulted to a significant difference with regard to age (Mean=3.71; SD=0.42).

3.1.5 Technological Pedagogical Knowledge (TPK)

Tabular value indicated that the perceptions of the respondents were found to have no significant differences in the domains of the TPK as exhibited by the p-value which is greater than 0.05.

This simply means that the respondents across age levels possess the TPK attributes accordingly.

3.1.6 Technological Content Knowledge (TCK)

Meanwhile, tabular value reveals that the perceptions of the respondents have no significant differences in the domains of the TCK as shown by the p-value which is greater than 0.05.

3.1.7 Technological, Pedagogical and Content Knowledge (TPACK)

Tabular value shows that the perceptions of the respondents were found to have a no significant difference in the overall domains of the TPACK as exhibited by the p-value which is greater than 0.05.

3.2 Comparison of TPACK Competencies of the Faculty Respondents when Grouped According to their Highest Educational Attainment

Educational attainment refers to the highest level of education that a person has successfully completed. Successful completion of a level of education pertains to the achievement of the learning objectives of that level, typically validated through the assessment of acquired knowledge, skills and competencies.

3.2.1 Technological Knowledge (TK)

As exhibited in Table 12, the tabular value shows that the perceptions of the respondents were found to have a significant difference in the domains of the TPACK-TK in reference to the p-value obtained which is less than 0.05. Hence, the respondents' perceptions are found to have a significant difference with regard to TK.

Table 12. Comparison of the Faculty Respondents' Responses on their TPACK Competencies when Grouped According to their Highest Educational Attainment

		Mean	S.D.	F-value	P-value	Sig	Remarks (Post Hoc)
TK	DMD	3.31	0.37				DMD VS MA/MS On-going MA/MS VS MA/MS & PhD
	MA/MS	2.90	0.64				
	PhD.	3.10	0.56	3.30	P = 0.014 < 0.05	S	
	On-going MA/MS	3.44	0.48				
	On-going PhD	3.16	0.10				
	Total	3.12	0.57				
PK	DMD	3.34	0.43				DMD VS PhD & on-going PhD MA/MS VS PhD & on-going PhD
	MA/MS	3.45	0.55				
	PhD.	3.82	0.25	6.15	P = 0.000 < 0.01	S	
	On-going MA/MS	3.50	0.39				
	On-going PhD	3.88	0.18				
	Total	3.59	0.45				
CK	DMD	3.46	0.40				DMD VS PhD & on-going MA/MS MA/MS VS PhD
	MA/MS	3.62	0.58				
	PhD.	3.87	0.24	3.40	P = 0.012 < 0.05	S	
	On-going MA/MS	3.80	0.22				
	On-going PhD	3.75	0.30				
	Total	3.71	0.42				
PCK	DMD	3.25	0.44				DMD VS MA/MS, PhD, on-going MA/MS & on-going PhD
	MA/MS	3.67	0.47				
	PhD.	3.83	0.37	6.20	P = 0.000 < 0.01	S	
	On-going MA/MS	3.75	0.44				
	On-going PhD	4.00	0.00				
	Total	3.69	0.46				
TPK	DMD	3.31	0.37				MA/MS VS PhD, on-going MA/MS & on-going PhD
	MA/MS	3.16	0.58				
	PhD.	3.55	0.46	3.73	P = 0.007 < 0.01	S	
	On-going MA/MS	3.48	0.40				
	On-going PhD	3.66	0.39				
	Total	3.38	0.50				

		Mean	S.D.	F-value	P-value	Sig	Remarks (Post Hoc)
TCK	DMD	3.44	0.51				
	MA/MS	3.22	0.59				
	PhD.	3.50	0.60	1.59	P = 0.181 > 0.05	S	
	On-going MA/MS	3.50	0.51				
	On-going PhD	3.67	0.51				
	Total	3.41	0.57				
TPACK	DMD	3.33	0.37				MA/MS VS PhD, on-going MA/ MS & on-going PhD
	MA/MS	3.14	0.52				
	PhD.	3.53	0.48	4.62	P = 0.002 < 0.01	S	
	On-going MA/MS	3.52	0.39				
	On-going PhD	3.77	0.40				
	Total	3.38	0.50				

Overall, the results of the mean proved that the graduates of DMD are found to have a significant difference with the MA/MS while the on-going MA/MS students have a significant difference with the PhD graduates as well as those pursuing their PhDs. The results revealed further to the fact that the younger the generation, the more confidence can be expected due to their exposure to various technological advancements specifically in the field of Dentistry. Likewise, it can also be attributed that the higher the educational attainment particularly those with PhDs resulted to higher TPACK competencies.

Table 13 Comparison of the Faculty Respondents' Responses on their TPACK Competencies when Grouped According to their Years of Teaching

		Mean	S.D.	F-value	p-value	Sig	Remarks
TK	1-5	3.40	0.44				1-5 VS 20 & above
	6-10	3.27	0.52				
	11-15	3.28	1.01	4.38	P = 0.003 < 0.05	S	
	16-20	3.22	0.36				
	20 & above	2.92	0.58				
	Total	3.12	0.57				
PK	1-5	3.42	0.38				1-5 VS 20 & above 11-15 VS 20 & above
	6-10	3.51	0.46				
	11-15	3.07	0.10	3.00	P = 0.022 < 0.05	S	
	16-20	3.59	0.43				
	20 & above	3.71	0.46				
	Total	3.59	0.45				
CK	1-5	3.66	0.33				6-10 VS 20 & above
	6-10	3.47	0.44				
	11-15	3.33	0.47	2.00	P = 0.100 > 0.05	NS	
	16-20	3.68	0.38				
	20 & above	3.80	0.45				
	Total	3.71	0.42				
PCK	1-5	3.52	0.50				1-5 VS 20 & above
	6-10	3.55	0.52				
	11-15	4.00	0.00	2.92	P = 0.024 < 0.05	S	
	16-20	3.57	0.53				
	20 & above	3.81	0.39				
	Total	3.69	0.46				
TPK	1-5	3.36	0.36				
	6-10	3.40	0.39				
	11-15	3.61	0.23	0.14	P = 0.966 > 0.05	NS	
	16-20	3.46	0.43				
	20 & above	3.38	0.60				
	Total	3.38	0.50				
TCK	1-5	3.45	0.50				
	6-10	3.45	0.52				
	11-15	3.50	0.70	0.12	P = 0.973 > 0.05	NS	
	16-20	3.43	0.53				
	20 & above	3.37	0.64				
	Total	3.41	0.57				
TPACK	1-5	3.43	0.37				
	6-10	3.46	0.42				
	11-15	3.43	0.61	0.32	P = 0.864 > 0.05	NS	
	16-20	3.44	0.38				
	20 & above	3.33	0.58				
	Total	3.38	0.50				

Considering the results of the mean for the Technological Knowledge domain, 1-5 years of teaching group (Mean=3.40; SD=0.44) was found to have a significant difference with 20 years and above (Mean=2.92, SD=0.58).

The findings imply that the lesser the years of the teaching experience, the more confident the respondents are in expressing their positive views with regard to TK. Faculty respondents who has lesser years in teaching experience belonged to the so called "millenials", digital natives" and the iGeneration age groups, thus they learn technology faster than those respondents with higher years in teaching experience.

Table 14. Proposed Faculty Training Program on Technological, Pedagogical and Content Knowledge (TPACK) Training for Dentistry Faculty Members

Learning Outcomes (*At the end of the training, at least 95% of the participants)*	Training Topics	Proposed Resource Speakers	Target/ Participants	Date/ Period	Venue	Budget for Estimate Expenses
1. Discuss the various innovative technologies used in the dentistry professional courses	1. Innovative Dental Technologies in the Dentistry Classrooms 1.1Digital X-rays 1.1.1 Panoramic 1.1.2 Cephalome-tric 1.1.3 Endodontic Microscope 1.1.4 CBCT 1.1.5 Intra-oral Dental Photography	Speaker A: A.1 Diplomate/Fellow of a specialty society A.2 Published researches with regard to TPACK in Orthodontics and Pediatric Dentistry	Faculty Members of the CEU School of Dentistry in four campuses namely: Manila, Malolos, Makati and Las Piñas	A. Before the start of the Academic School Year or Semester.	Centro Escolar University Manila Seminar Rooms and Dental Infirmary	A. Honorarium for the Speaker B. Materials C. Food D.Documentation E. Evaluation Forms F. Invitations and Program
2. Exhibit familiarity in the common student understanding and misconceptions on Pedagogical Knowledge (PK)	2. Addressing Issues on Pedagogical Knowledge in Dentistry Professional Courses	Speaker B: B.1 Dean of a School of Dentistry of an Institution in Manila with specializations in Fixed Partial Denture (FPD), Removable Partial Denture (RPD) and Complete Denture (CD) B.2 A Fellow of a Specialty Society B.3 Must have post graduate studies in Prosthetic Dentistry and Dental Materials		B. After the Academic School Year or End of the Semester		G. Handouts and Kits H. Plaque and Certificates I. Venue
3. Show awareness on scientific knowledge in Oral Diagnosis as regard to Content Knowledge (CK)	3. Current Trends, Innovations and Advances in Prosthetic Dentistry					
4. Create opportunities to further use analytical and holistic type of thinking in Orthodontics with regard to Content Knowledge (CK)	4. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT).	Speaker C: C.1 A Diplomate/Fellow of a specialty society. C.2 Must have published latest researches in a Refereed Journal with regard to the latest trends and innovation in the treatment of Periodontal diseases and the use of the latest technology in Implant Dentistry. Likewise,advanced training on the use of latest technology in root canal cleaning and shaping, particularly the use of Rotary Instruments in Endodontics				
5. Explore more insights on various ways and strategies of dealing with care and treatment of children's teeth in Pediatric Dentistry in terms of Content Knowledge (CK).	5. Current Trends and Innovations in Pediatric Dentistry	Speaker D: D.1 A Diplomate/Fellow/ Consultant of a specialty society D.2 Must have published researches with regard to the latest technology used in Oral Surgery. D.3 Must have completed post-graduate studies with regard to the latest innovation and techniques using latest technology in Oral and Maxillofacial Surgery as well as Oral Diagnosis and Dental Radiology.		C. Summer Period		
6. Critique a research in Endodontics to further enrich constructive and critical-analytic type of thingking with regards to Content Knowledge (CK)	6. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Endodontics.					
7. Create a list of other strategies and techniques of developing understanding on the removal of the dental pulp and other tissues of the pulp cavity, cleaning and shaping the root canal, and its replacement with suitable filling material.	7. Current Trends and Innovations on the use of rotary instruments in root canal therapy (RCT).	Speaker E E.1 A Fellow or Diplomate in Aesthetic Dentistry of a Specialty Society E.2 Must have published researches in Aesthetic Dentistry in a reputable Journal. E.3 An active dental practitioner with specialization in Aesthetic Dentistry				

Table 14. Proposed Faculty Training Program on Technological, Pedagogical and Content Knowledge (TPACK) Training for Dentistry Faculty Members

Learning Outcomes (*At the end of the training, at least 95% of the participants)*	Training Topics	Proposed Resource Speakers	Target/ Participants	Date/ Period	Venue	Budget for Estimate Expenses
8. Construct a matrix of different studies and strategies that focus on the inflammatory diseases that destroys the gingiva and othersupporting structures regarding Content Knowledge (CK) in Periodontics.	8. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Periodontics.	Speaker E E.1 A Fellow or Diplomate in Aesthetic Dentistry of a Specialty Society E.2 Must have published researches in Aesthetic Dentistry in a reputable Journal. E.3 An active dental practitioner with specialization in Aesthetic Dentistry				
9. Brainstorm on various knowledge and maintenance of oral functions by the replacements of missing teeth and other oral structures by artificial devices.	9. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Prosthetic Dentistry.					
10. Reflect on the use of science and critical way of thinking as guide for clinical decision-making about Content Knowledge (CK) in Prosthodontics	10. Current Trends and Innovations in Prosthetic Dentistry and Dental Materials					
11. Interview fellow participants on the various ways and strategies of developing understanding of conditions of the jaw and mouth structures requiring surgical interventions with regard to Content Knowledge (CK) in Oral Surgery.	11. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Oral and Maxillofacial Surgery.					
12. Create a mini action plan about the utilization of technology in the classroom to further enhance Technological Pedagogical Knowledge (TPK).	12. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Pre-Clinical Dentistry Professional Courses.					
13. Write a reflection on how to achieve leadership in Technological, Pedagogical and Content Knowledge (TPACK)	13. Current Trends and Innovations on the use of Cone Beam Computed Tomography (CBCT) in Oral Diagnosis, Orthodontics, Pediatric Dentistry, Restorative Dentistry, Endo-dontics, Periodontics, Prosthodontics and Oral Surgery					

CONCLUSIONS

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

1. Technological Knowledge (TK). The respondents need to know more about various forms of technology.

2. Pedagogical Knowledge (PK). The respondents need to be familiar with common students' understanding while misconceptions must be enhanced.

3. Content Knowledge (CK)

3.1 Analytical, comprehensive and systematic way of thinking in Oral Diagnosis must be enhanced.

3.2 Various ways and strategies of dealing with care and treatment of children's teeth must be addressed in Pediatric Dentistry.

3.3 Sufficient knowledge about the diagnosis and integrated management of diseases of the teeth and their supporting structures and the rehabilitation of the dentition to functional and aesthetic requirements of an individual should be maintained and strengthened.

3.4 The use of critical and comprehensive way of thinking and various ways and strategies of developing their understanding of the restoration of a diseased, injured, or abnormal function must be enhanced in Restorative Dentistry.

3.5 The use of a constructive, creative and critical-analytic type of thinking, various ways and strategies of developing their understanding on the removal of the dental pulp and other tissue of the pulp cavity, cleaning and shaping of the root canal, and its replacement with suitable filling material, must be subjected for enhancement in Endodontics.

3.6 Strategies that focus on the inflammatory diseases that destroy the gingiva and other supporting structures around the teeth must be improved.

3.7 Restoration and maintenance of oral function by the replacement of missing teeth and other oral structures by artificial devices and can use science and critical way of thinking as guide for clinical decision-making must be improved in Prosthodontics.

3.8 The diagnosis and treatment of oral conditions requiring surgical interventions must be further enhanced in Oral Surgery.

Pedagogical Content Knowledge (PCK)

Selection and application of effective teaching approaches to guide student thinking and learning in the dentistry professional courses they teach must be maintained and enhanced.

Technological Pedagogical Knowledge (TPK)

The lack of knowledge that their former dentistry professors in dental school has caused them to think more deeply about how technology could influence the teaching approaches they used in their classroom must be improved.

Technological Content Knowledge (TCK)

The knowledge about technologies that they can use for understanding the dentistry professional courses they teach must be maintained and further enhanced.

Technological Pedagogical and Content Knowledge (TPACK)

Coordination in the use of content, technologies and teaching approaches at their school and/ or section must be strengthened.

RECOMMENDATIONS

After a conscientious examination of findings and formulation of conclusions, the following are hereby suggested:

1. Conduct Faculty Development Program to include the following:
   1.1 Use of learning management styles in dentistry professional courses to include the use of Canvass, Moodle, Schoology among others.
   1.2 Current trends and innovations in dental practice.
   1.2 Workshops and calibration seminar in the areas of Restorative Dentistry, Prosthodontics, Endodontics and Periodontics.
   1.3 Use of dental photography, digital radiography, engine-driven rotary instruments and high-powered electron microscope in clinical dentistry courses.
   1.4 Hands-on training on the use of Cone Beam Computed Tomography (CBCT) in the various dentistry professional courses.
2. Explore the possibility of conducting researches/experiments about Technology Integration in the classroom and in various content areas of clinical dentistry.
3. Replicate the study in other dentistry schools in a larger scale.

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AGGRESSIVE BEHAVIOR OF THE LOWER LEVEL MANAGERS AND ORGANIZATIONAL EFFICIENCY OF A TELECOMMUNICATION COMPANY IN METRO CEBU, PHILIPPINES

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ABSTRACT

This study aims to increase awareness of the rank-and-file employees and immediate supervisor on the impact of supervisor aggression on organizational efficiency. The key informants of the study were randomly selected rank-and-file employees and immediate supervisors of a telecommunications company. Data collected from the key informants were analyzed using the qualitative research method of inquiry. After analyzing the data, the information was treated using the Collaizi's Phenomenological Method. The study found that aggressive behavior may contribute or impede the efficiency of the organization depending on the lower-level management agenda on productivity and the employees' desire and motivation towards work. Moreover, there were employees who claimed that aggression could have both positive and negative influences to the employees, although there were notably more negative influences. Finally, the study revealed that aggressive behaviors have harmful effects on employee emotions such as emotional exhaustion and decreased productivity. The negative effects impeded the efficiency of the organization and were identified as probable causes of employee turnover. It was concluded that direct supervisors could cause stress on their employees due to the pressure from top management and high work expectations. It is recommended that mutual evaluation focusing on supervisory aggression and productivity demands be administered periodically on rank-and-file employees and supervisors. Furthermore, time, stress, and conflict management workshops among employees and supervisors be conducted subsequent to the evaluation to heighten the level of awareness of rank-and-file employees and supervisors on the negative effects of supervisor aggression towards the former.

Keywords: Aggressive Behavior, Immediate Supervisors, Lower-level Managers, Organization, Efficiency, Productivity, Employee Emotions, Telecommunications, Collaizi's Phenomenological Method.

INTRODUCTION

The working environment and relationship are contributing factors that lead to the attainment of every company's goals. There are those who take the pressure positively where they see things as opportunities to improve themselves. However, there are those who consider pressure as a reason to be demotivated that result in deviating from their standard operational process. Pressure can also lead to conflict among employees and to a high rate of turnovers. Thus, the burden of uplifting the spirits of the employees despite stress and pressure lies on the leadership of the superior. Turknett and Anderson (2015) stated that a very aggressive leader can be very demanding in terms of achieving goals and can at times be very insensitive to the feelings of others. He also has the tendency to be harsh or even to bully those who are not meeting or exceeding his expectations. McGregor (2017) studied that aggression is a behavior that leads one to cause harm to others. It may be someone who is doing or saying something you do not like, so you do something to that person in a bid to stop them from doing or saying it, such as threaten them with violence. Bandura (2016) pointed out that aggressive behavior may cause physical or psychological harm to others.

Tepper (2017) supported that abusive leadership creates a negative impact to the attitude and behavior of the employees; hence it is important to sustain non-physical abuse.

On the other hand, Gupta (2017), Roim and Itskowitz (2015) mentioned that a certain level of aggression helps promote cooperation and healthy competition among peers. It also helps foster self-assertiveness, dominance, and independence towards achieving mastery. He is supported by Ellis (2015), who pointed out aggressive behavior can be beneficial when it leads to promote survival, protection, happiness, social acceptance, preservation, and intimate relations within the workplace. Their claims seconded by Jack (2018) who believed that aggression has positive effects like self -protection, endurance against negation, optimism, and self-defense. In addition to positive claims, Gayle (2016) said that aggressive managers are more likely to enjoy career success than even their more competent rivals.

STATEMENT OF THE PROBLEM

The primary aim of the study was to determine the existence of aggressive behavior among leaders in telecommunication companies. It also determined how their relationship affected the efficiency of the organization and the relationship of their employees. Moreover, the study aimed to give the positive and negative effects of aggressive behavior to the interpersonal and intrapersonal relationships in the working environment.

1. What were the lived experiences of the participants from the aggressive behaviors among heads of offices?
2. Did aggressiveness contribute to organizational efficiency?
3. What were the factors that could contribute and impede aggressive behavior and organizational efficiency?

METHODOLOGY

This study used a qualitative research method applying the Husserlian narrative inquiry route to extract data from the experiences of the employees from their aggressive superiors.

Participants with Sampling Design

The key informants of the study were the randomly selected managers, officers, and staff members of a telecommunication companies in metro Cebu, Philippines. Key informants were coded as Key Informant-1 (KI-1), Key Informant-2 (KI-2), Key Informant-3 (KI-3), Key Informant-4 (KI-4), Key Informant-5 (KI-5), Key Informant-6 (KI-6), Key Informant-7 (KI-7), Key Informant – 8 (KI-8). Key Informant-9 (KI-9), Key Informant- 10 (KI-10), Key Informant-11 (KI-11), Key Informant-12 (KI-12), Key Informant-13 (KI-13), Key Informant-14 (KI-14), Key Informant-15 (KI-15), Key Informant-16 (KI-16), and Key Informant-17 (KI-17).

Data Gathering Procedures

The entire interview process approximately ran for 45 minutes to 1 hour. In administering the interview, the researchers randomly chose any available manager, officer, and staff member. Interviewee was assured about the confidentiality of his or her answers to avoid any feeling of discomfort and apprehensions. He or she was given 15-20 minutes to clarify some questions to make sure that answers provided would be accurate. Analysis and interpresentation followed after all data were gathered.

Data Analysis

Data were treated using Collaizzi's descriptive phenomenological method. The researcher studied thoroughly the gathered responses of the participants. The responses were analyzed based on the relevance to the study. They had to reflexively "btacket" his or her pre-suppositions to stick closely to the phenomenon as experienced. They clustered the identified meanings into themes that are common across all accounts. They condensed the exhaustive description down to a short, dense statement that captured just those aspects deemed to be essential to the structure of the phenomenon.

Research Ethics

The researchers had observed ethical principles in conducting the research study particularly in gathering data procedure. The principles of respect for persons, beneficence, and justice were also strictly complied. Key informants were treated in an ethical manner not only by respecting their decisions and protecting them from harm, but also making efforts to secure their well-being.

FINDINGS

The lived experiences of the subordinates from their aggressive immediate superior showed the positive effects of policy compliance and tight

management and the negative effects of counter-productivity to work productivity and efficiency in the organization.

Table 1

Main Theme	Sub-Theme	Key Informants (KIs)
Work Efficiency or Productivity	Positive Effect of Aggressive Behavior	KI-1 and KI-2
Work Improvement Through Discipline	Policy Compliance	KI-2, KI-3, KI-4, KI-5, and KI-9
	Tight Management in a Competitive Environment	KI-7
Counter Productivity	Negative Effects of Aggressive Behavior	KI-6
Work Inefficiency	Negative Effects of Aggressive Behavior	KI-1
	Negative Personality Impression of Leadership	KI-8

Gupta (2013), Roim and Itskowitz (2015) that a certain level of aggression helps promote cooperation and healthy competition among peers. It also helps foster self-assertiveness, dominance, and independence towards achieving mastery. He is supported by Ellis (2015) who pointed out that aggressive behavior can be beneficial when it leads to promote survival, protection, happiness, social acceptance, preservation, and intimate relations within the workplace. This theory was strengthened by KI-1 and KI-5 when they experienced a more efficient and productive working environment under an aggressive imme the violations of regulations and diate supervisor. It takes a little tightening of belts to be able to produce something good.

Furthermore, Bugdol (2018), belived that employees must be controlled. He added that strict observance to procedures results to the improvement of work efficiency. This idea was supported by the responses if KI-2, KI-3, KI-4, KI-5, KI-7, and KI-9. As quipped, they agreed that strict compliance of the standard operating procedures result in an effective and efficient working condition. If at some point, management tends to loosen up, it would make tha employees relaxed but ineffective at the same time.

Discipline is an attitude and behavior that reflects the level of compliance or adherence to the various applicable regulations and corrective measures against standards set out in the organization. This theory was strongly opposed by Alarcon (2016) who mentioned that negative emotions and aggressive behavior of employees are two noticeable reasons for increased organizational costs. It means that if the management is too tight in their dealing, it would make the staff to be rebellious. This statement was supported by Harris, Kacmar, and Zivousska, (2017) who added that some of the common behaviors demonstrated by these leaders are ridiculing and degrading employees, lying and deceptiveness, blaming others for their mistakes, harassing, and aggressing physically. KI-1, KI-6, and KI-8 agreed strongly as they had a firsthand experience with an aggressive immediate superior. They added that this abusive leadership could be associated with a low work performance.

Table 2

Main Theme	Sub-Theme	Key Informants (KIs)
Feedbacks of Aggressive Behavior to Organizational Efficiency	Positive	KI-1, KI-5, KI-6, KI-7, KI-8, KI-9
	Negative	KI-2, KI-4
	Positive and Negative	KI-3

Pinprayong and Singthai (2015) stated that the organizational efficiency reflects the improvement of internal processes in regard to management, productivity, quality, and profitability. This theory was supported by KI-1, KI-5, KI-6, KI-7, KI-8, and KI-9 who said that under an aggressive superior, employees became more aggressive and more committed in achieving individual and organizational sales' goals. The aggressive behavior, therefore, contributes to something positive to the organization.

Unfortunately, Lim (2018) mentioned that aggression in the workplace can destroy employee morale and cause of employee turnover. These statements were seconded by KI-2, KI-3, and KI-4 who felt emotionally burned out, lack of self-esteem, and low employee morale because of their aggressive supervisor.

On the other hand, Blustein (2016) argued that aggression can be both a positive and a negative behavior. Key Informant 3 believed in this statement.

Table 3

Main Theme	Sub-Theme	Key Informants (KIs)
Contributors and Hindrances of Organizational Efficiency Through Aggressive Behavior	Emotional Exhaustion and Self-Motivation	KI-1, KI-2, KI-3, KI-4, KI-5, KI-7
	Self-Motivation	KI-6
	Emotional Exhaustion	KI-8, KI-9

Yazdanifar (2018) pointed out that motivation is an external factor which arrives employees. KI-1, KI-2, KI-3, KI-4, KI-5, KI-6, and KI-7 who got motivated when under an aggressive leader. According to key informant, the aggressive leader. According to the key informant, the aggressive leader considered security as his reason and strength not to give up on any challenging task.

Bakker and Costa (2015) on the other hand disapproved of the latter's statement. He described emotional exhaustion as a feeling of being emotionally drained by one's work. He was strongly supported by Tepper (2017) who mentioned that abusive leadership increases employees emotional exhaustion. They were supported by KI-1, KI-2, KI-3, KI-4, KI-5, KI-6, KI-7, KI-8, and KI-9 who perceived that emotional exhaustion due to an aggressive leader who could hinder the operational efficiency of the organization.

Hollinger and Clarke (2016) stated that production deviance are behaviors that deviate from the norms resulting to the minimal quality and quantity of work accomplished. In addition, Penny and Spector (2015); Spector 2018) stated that counterproductive behaviors are the results when employees are not able to cope with stress from the work and work process. Furthermore, he stated that whenever employees are stressed, they experienced negative feelings will affect their behaviors towards work productivity due to organizational frustrations. KI-1, KI-2, KI-3, KI-4, KI-5, KI-6, KI-7, KI-8, and KI-9 agreed that lack of Manpower, limited resources, and lack of managerial support and etc. provoked the counter productivity behavior of the employees.

However, Kallimullah (2016) claimed that organizations are more successful when employees are motivated to work and improve their work. This theory was confirmed by KI-1, KI-2, KI-3, KI-4, KI-5, and KI-6 as they agreed that personal desire motivates to the efficient in their work.

CONCLUSION

This study finds that subordinates experience emotional exhaustion like stress and pressure and tend to deviate from the company's policies because of their aggressive superior. These are the reasons that impede the efficiency of the organization. On the other hand, this study found that direct heads could cause stress on their subordinates due to the pressure from top management, high demand of work and expectation despite poor working environment and inappropriate employee attitudes.

RECOMMENDATIONS

Based on these findings and conclusions, the researchers recommend the following;

1. Conduct time, stress, and conflict management workshops to help both subordinates and direct heads to achieve organizational efficiency despite negative working conditions.
2. Conduct behavioral and interpersonal seminar to improve social relationships among working colleagues.
3. Conduct quarterly recreational activities that would help promote camaraderie among members of the organization.
4. Provide financial and travel incentives to employees who have reached or exceedd monthly goals to help them continually be motivated and inspired to be productive at work.

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AN EMPIRICAL ANALYSIS ON THE SERVICE SECTOR IN THE PHILIPPINES

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ABSTRACT

The Philippine's economy has seen to have tremendous increase in the next few years. The share of service sector in GDP has increased by 19 percent over the past 30 years. Growth has been attributed by the increase of overseas workers, earnings from semi-conductor and electronic industry, IT services and by tourism. Thus, this paper examines the other factors affecting the growth of service sectors from 1982-2016. Secondary data were used to analyze the service sector in the country. The subsectors used in the study include only transportation, storage and communication, trade and repair, financial intermediation, real estate, renting and business activities, public administration and defense, and other services. The determinants of the service sectors used in the study were gross domestic product, growth rate, population, government consumption, external debt, and foreign direct investment. Multiple regression analysis was used to examine the data. The results of the study showed that more Filipinos were engaged in the service sector. It is recorded that the increase in investment in financial intermediation and real estates contributed to the growth in the service sector. Also it can also be seen that an increase in population and government consumption lead to progress in the economy. Hence, if the government spends more for social services, it will improve the human capital needed for the service sector.

Keywords: Service sector, Population, GDP, Government Consumption, Increase

INTRODUCTION

The Philippine's economic growth is expected to grow between 6.5 to 7.5 percent twice as the country's long-term goal. The annual GDP growth rate averaged by 3.68 percent from 1982 until 2017. The lowest marked in 1985 with -11.10 percent while the highest was recorded on the fourth quarter of 1988 (Tradingeconomics.com). On the other hand, the economy has been stable which is resulted by low inflation and low debt to GDP ratio. This became the reason why the country has sustained domestic demand growth. Further, an increase in exports rose by 12.1 percent (USD 4.81 billion) in April 2017 (Mourdoukoutas, 2017). GDP growth in the second quarter of 2017 grew by 6.5 percent and 6.4 percent in the first half of the year. The strengths of the GDP growth were rich natural and human resources. However, historical data shows the country's performance has lagged behind of its East and Southeast Asian Neighbors. The share of service sector in GDP has increased from 36 percent to 55 percent in the period of 30 years.

According to a report of Bajpai (25 June 2019), the service sector has increased by 60 percent in 2017 which employs almost 54 percent of the total workforce. Business Processing Outsourcing played a significant role in the growth since the country has been one of the best location for investment of such industry. The Philippines provide skilled professionals good in language and with strong customer service orientation of its workforce. Tourism, on the other hand, also contributed on the growth of the service sector even the country has poor program in attracting foreign tourists. Lastly, export services through remittances of the Filipinos working abroad has been recorded as contributor in Service Sector.

The country has used to be called as an agricultural country but through the years, the service sector overtook the increase in its Gross Domestic Product. Thus, this paper will try to analyze the trend and examine the other factors affecting the growth of the service sector in the past 34 years.

The results of the study will provide information to the policymakers on creating parameters/ policies to improve the sector. Further, with the use of other determinants, the results will also provide recommendations in which of these the government will focus to develop plans for the betterment of the service sector.

STATEMENT OF THE PROBLEMS/ OBJECTIVES

The study aimed to make an empirical analysis on the Philippine Service Sector from 1982-2016. Specifically, it aimed to:

1. Examine the performance of service sector for the past 34 years in terms of:
   a. Transportation, storage and communication
   b. Trade and Repair
   c. Financial Intermediation
   d. Real Estate, Renting and Business Activities
   e. Public Administration and Defense
2. Analyze the annual growth rate in the service sector;
3. Explore the determinants of service sector in the Philippines; and
4. Analyze the significant relationship of these determinants to the service sector in the Philippines

METHODOLOGY

Descriptive-causal design was used in the study to discuss the performance of the service sector in the Philippines from 1982 to 2016. In this study, the trends of the subsectors such as transportation, storage and communication; trade and repair; financial intermediation; real estate, renting and business activities; and public administration and defense was also discussed descriptively.

Moreover, the study examined the determinants of the service sectors such as gross domestic product growth rate, population, government consumption, foreign direct investment and external debt.

The study used secondary data from Philippine Statistics Authority, World Bank, United Nations and *Bangko Sentral ng Pilipinas.*

Hypothesis of the Study

Ho – There is no significant relationship between the determinants such as gross domestic product growth rate, population, government consumption, foreign direct investment and external debt and the service sector of the Philippines.

The Equation

$$GVA = f(GDP_R, Pop, GC, ExD, FDI,)$$

Whereas:
GVA = Gross Value Added in Service sector
GDPR = Gross Domestic Product Growth Rate
Pop = Population
GC = Government Consumption
ExD = External debt
FDI = Foreign Direct Investment

A multiple regression analysis was used to examine the data with the help of Eviews software. Furthermore, the following test was performed:

1. Augmented Dickey Fuller unit root test- to verify the stationary of time series data.
2. Multicollinearity (Variance Inflation Factors)- This occurs when there is an approximate linear relationship between the explanatory variables, which could lead to unreliable regression estimates
3. RAMSEY Reset – It is sued to test the specification errors such as the omitted values and incorrect functional forms.
4. Chow Test - The model in effect uses an F-test to determine whether a single regression is more efficient than two separate regressions involving splitting the data into two subsamples.
5. White Heteroskedasticity – It is assumed that heteroscedasticity may be a linear function of all the independent variables, a function of their squared values, and a function of their cross products.
6. Jarque-Bera Normality Test – The test matches the skewness and kurtosis of data to see if it matches a normal distribution
7. Johansen Co-integration- to test the long-run relationship of the variables.

The Model

The study used a non-linear multiple regression model, given below:

$$GVA = \beta_1 + \beta_2 GDPR + \beta_3 Pop, + \beta_3 GC + \beta_4 FDI + \beta_5 ExD + \mu$$

To satisfy OLS, the model was transformed into a linear multiple regression equation. Thus, the equation became:

$$lnGVA = \beta_1 + \beta_2 GDPR + ln\beta_3 Pop, + ln\beta_3 GC + \beta_4 FDI + ln\beta_5 ExD + \mu$$

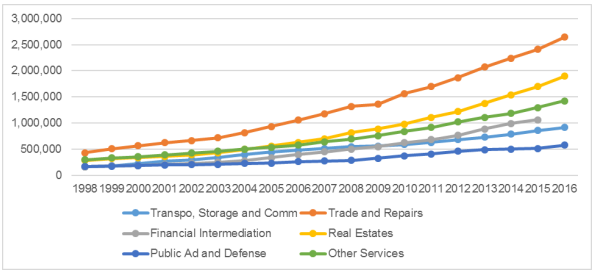
FINDINGS

This section discusses the Philippine Service Sector. However, its subsectors only include transportation, storage and communication; trade and repair; financial intermediation; real estate, renting and business activities; public administration and defense; and other services. Unfortunately, due to unavailability of data, only the years 1998 to 1986 were discussed under the service sector. Moreover, other variables used in the study were gross values added for service sector; foreign direct investment; employment in the service sector; gross domestic product per capita; and external debt from 1982 to 2016.

The Philippine Service Sector has increasing trend from 1998 until 2016 (Figure 1). It can be observed that Trade and Repairs had the highest income earned from the past 18 years while income from Public Administration and Defense had the least income. However, in terms of growth rate Financial Intermediation had the highest annual growth rate of 11.63 percent.

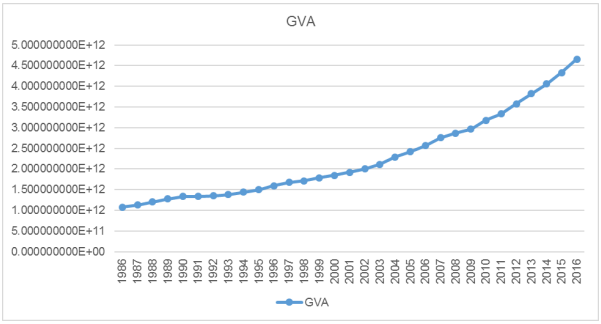
Figure 2 shows the increasing Gross Value Added in the Service Sector in the Philippines from 1982 to 2016. The annual growth rate is 6.94 percent. According to the Philippine Statistical Authority, the sector was the fastest in growth which can be attributed from its subsectors such as Trade; Real Estate, Renting and Business Activities; and other Services. According to the Philippine Statistics Authority, from 40 million Filipinos employed 55.4 percent are in the service sector (Lumawag, 2017). According to Mitra, an increase in number of overseas workers, semiconductor and electronic industry, IT services and BPO exports and tourism has seen as contributing factors in the increase in employment in service sector.

The GDP Annual Growth Rate in Philippines, as shown in Figure 3, averaged 3.74 percent from 1982 until 2016, reaching an all-time high of 12.40 percent in the fourth quarter of 1988 and a record low of -11.10 percent in the first quarter of 1985 (Tradingeconomics, n.d.).



Source: Bangko Sentral ng Pilipinas

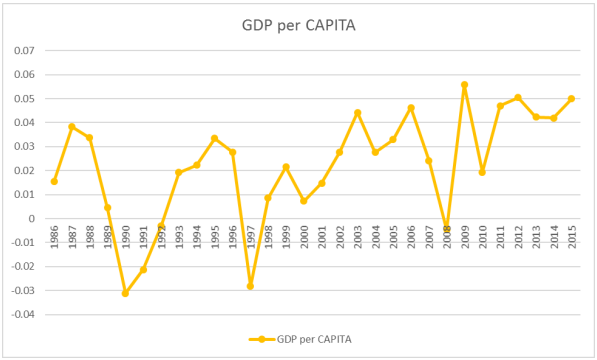
Figure 1. The Philippine Service Sector, 1998-2016



Source: World Bank

Figure 2. The Gross Value Added in Service Sectors of the Philippines, 1982-2016

The growth can be observed from the increase in exports, government expenditures and advancement in the service sector. Growth in GDP was a result from the expansion in the government consumption by 8.3 percent, household consumption and the continuous flows from the overseas remittances (FocusEconomics, n.d.).

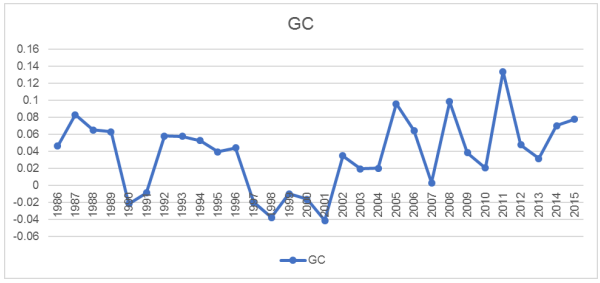


Source: World Bank

Figure 3. The Gross Domestic Product Growth Rate of the Philippines, 1982-2016

Meanwhile, the annual growth rate of Government Consumption was 5.93 percent (Figure 4). The typhoon Milenyo has contributed damages in properties which reached up to P2.93 billion with the agricultural sector suffered the most. However, it can be attributed from the growth

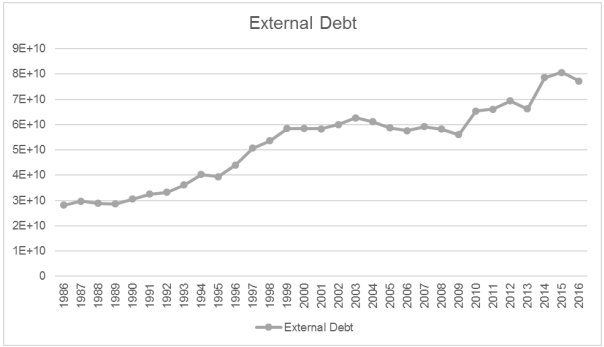
happened due to the increase in the repairs in the damages of schools, bridges and other damaged infrastructures (Senate Economic Planning Office, 2006).



Source: World Bank

Figure 4. Government Consumption in the Philippines, 1982-2016

External debt refers to all borrowings made by the Philippine residents from non-residents, following the residency criterion for international statistics (BSP, 2017). The Philippines has increasing debts for the past 30 years (Figure 5). However, a decline happened in the year 2008 and 2014 with -1.53 percent and -4.6 percent, respectively. The decline was a result from negative foreign exchange revaluation in 2014 as the US Dollar strengthened against most third currencies. In addition, public sector debt had declined from US$4.1 billion in June 2014 to US$40.7 billion and private sector debt was down by US$0.1 billion (BSP, 2014). Further, a decrease in debts also experienced in 2016 by 1.3 percent. The full downward impact of these factors on the debt stock was slightly offset by a modest increase in non-residents' investments in Philippine debt papers issued offshore (US$126 million) during the period (BSP, 2017).

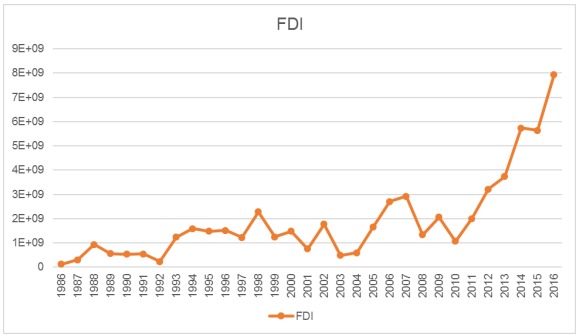


Source: World Bank

Figure 5. External Debt in the Philippines, 1982-2016

The Foreign Direct Investments had fluctuating trends from 1982 to 2016 (Figure 6). The lowest growth rate was recorded in 2003 with -72.19 percent. This was due to the political instability of the country during the time of Estrada and Arroyo Administration (Arangkada Philippines, 2010). Further, Japan and Taiwan, the top two foreign investors, had lowered their investments by almost 30 to 40 percent of their total investments (PSA, 2004). On the other hand, since 2010, the FDI was increasing due to more pledges of other Asian countries like Korea (P23.8 billion) followed by Japan and Singapore amounting to P10.2 billion and P5.3 billion, respectively (PSA, 2010). Continuously, the country had been increasing FDIs with the reinvestments and net borrowings from the countries like Japan, United States, Hongkong, Singapore and Germany.

The country has a growing population since 1982. In 2016, the Filipinos were 103.3 million. It has the world's fastest urbanizing countries and overcrowded cities. The rate of natural increase — the birth rate minus the death rate — is 2.2 percent, compared with 0.8 percent in Thailand and Singapore and 1.9 percent in Malaysia (Collymore, 2003).



Source: World Bank

Figure 6. Foreign Direct Investment in the Philippines, 1982-2016

Table 1 shows the unit root test of the Gross Value Added in Services Sector and its explanatory variables such as GDPR, Population, Government Consumption, FDI and External Debt. The GVA, GDPR, Population, FDI and External Debt were stationary at 1st Level Difference while Government Consumption was stationary at 2nd level Difference. Therefore, the regression is still feasible.

Table 1. Augmented Dickey-Fuller and Mackinnon Critical Values

Variables	Levels	ADF Test Statistics	Mac Kinnon Critical Values		
			1%	5%	10%
lnGVA	1st Difference	-4.440828	-4.262735	-3.552973	-3.209642
GDPR	1st Difference	-6.337119	-3.653730	-2.957110	-2.617434
lnPop	1st Difference	-4.950011	-2.641672	-1.952066	-1.610400

Variables	Levels	ADF Test Statistics	Mac Kinnon Critical Values		
			1%	5%	10%
lnGC	2nd Difference	-7.427249	-4.273277	-3.557759	-3.212361
FDI	1st Difference	-7.002008	-4.262735	-3.552973	-3.209642
lnExD	1st Difference	-5.709392	-4.262735	-3.552973	-3.209642

Table 2 shows the regression results of the study after being corrected for autocorrelation. The model initially suffered with low DW indicating a problem of serial autocorrelation. To correct it, the model was subjected to the second order autoregression process where AR(2) was added to the model. The computed d statistics of 1.889883 which tends toward 2. It indicates that the model has no serial correlation. Therefore, the estimated results are reliable and efficient.

The regression results show that GDPR, Foreign Direct Investment, and External Debt do not significantly affect the Gross Value Added of Service Sector since their computed t-values of 0.022506, -1.508771 and -0.567163, respectively, were less than the critical t-value of 1.697 at 5 percent level of significance.

Table 2. Regression results corrected for autocorrelation

$$lnGVA = -17.68637 + 4.94^{-5}GDPR + 1.528844lnPop + 0.699305lnGC - 1.36^{-11}FDI - 0.061300lnExD + \mu$$

t-values (0.022506) (3.861640) (8.373452) (-1.508771) (-0.567163)

R2 = 0.998269 **Adj R2** = 0.997736

F- Statistic = 1873.747 **D.W.** =1.892152

Critical Values

F(5, 35) = 2.48

t-ratio(0.05) = 1.697 ; t-ratio(0.10) = 1.310

d.w. = dl = 1.160; du = 1.735

The null hypothesis that determinants such as GDPR, Foreign Direct Investment and External Debt has no significant relationship with the Gross Value Added of Service Sector is accepted. The changes in the service sector are not influenced by these factors.

On the other hand, Population and Government Consumption have significant effect in the Gross Value Added of Service Sector with the computed values of 3.861640 and 8.373452, respectively which are greater than the critical t-value of 1.697 at 5 percent level of significance. Consequently, the null hypothesis that determinants such as Population and Government Consumption have no significant relationship with the Service Sector is rejected. This only means that in every 1 percent increase in Population, there would be a 3.861640 percent increase in the Service Sector. Further, a 1 percent increase in Government Consumption, a 8.373452 increase in the Gross Value Added of Service Sector.

The adjusted R2 of 0.998269 indicates that 99.83 percent of the total variation in Gross Value Added of Service Sector were being explained by the variations of GDPR, Population, Government Consumption, FDI and External Debt.

The computed F-value of 1873.747, which exceeds the critical F-value of 2.48 at 5 percent level of significance implies that the model is significant.

The following test were performed to check if the model is reliable and stable to be used:

The Variance Inflation Factor (VIF) was employed to detect the presence of multicollinearity. Table 3 shows the VIFs of the explanatory variables. The VIF for GDPR, Population, Government Consumption, FDI and External Debt were 1.695485, 2.981083, 2.685277, 1.946977, and 2.115768 respectively. These were less than 10. Thus, multicollinearity was not a serious problem in the model.

Table 3. VIF of the explanatory Variables

Variables	VIF
GDPR	1.695485
lnPOP	2.981083
lnGC	2.685277
FDI	1.946977
lnExD	2.115768

Table 4 shows the results to test the stability of the model. The result of the RAMSEY Reset Test shows that the F-Statistic of 2.327357 is less than the critical value and the probability value is greater than 5 percent level of significance. Thus the regression model is reliable.

Table 4. Tests for the reliability and stability of the model

Test	F-Statistic	Probability
RAMSEY Reset Test	2.327357	0.0787
Chow Breakpoint Test	1.854963	0.1303
White Heteroskesdaticity	164.0558	0.0000

Moreover, the F-statistic value of chow breakpoint test is 1.854963 which is less than the critical value of 2.49 at 5 percent level of significance. Moreover, given the probability of 0.1303 which is greater than 5 percent level of significance, the null hypothesis that the Gross Value Added of Service Sector is not a stable function of GDPR, Population, Government Consumption, FDI and External Debt is rejected. The parameters are then stable.

The presence of heterokedasticity was tested using the White Test. The F-statistic value of 2.841103 is less than the critical F-value of 164.0558 and given the probability value, 0.0000, which denotes highly significant, show that the coefficients were relatively constant. Hence, the conclusion from the F-statistic is reliable.

Figure 9 shows the result of normality. The Jarque-Bera result is 1.403580 with p-value, 0.4956977 which is greater than 5 percent level of significance. This indicates that the regression residuals are normally distributed.

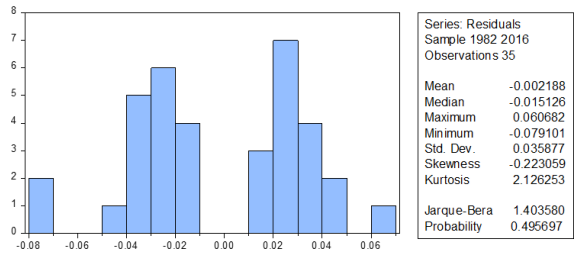


Figure 9. Jarque-Bera Normality Test

To test the long-run relationship among the variables, the Johansen Cointegration Test was used. Table 5 shows the result of the test. The Trace Statistic Value is greater than the 5 percent critical value. This signifies that the Gross Value Added in the Service Sector is cointegrated with GDPR, Population, Government Consumption, FDI, and External Debt. Further, it shows that there is a long-run relationship among the variables.

Table 5. Johansen Cointegration Test

Eigenvalue	Trace Statistic	5 Percent Critical Value	Hypothesized No. of CE(s)
0.888469	185.9958	95.75366	None*
0.853780	113.6119	69.81889	At most 1*
0.570285	50.16456	47.85613	At most 2*

CONCLUSION

The Philippine Service Sector has seen to grow for the next years based from the results of the study. Its subsectors have increasing trend which shows that more Filipinos are more engaged in this sector. It can also be concluded that there would also an increasing output coming for financial intermediation since it has the highest growth rate among the subsectors. Real estate is also a contributor in the growth of the sector, since it is the second among the subsectors with the high annual growth rate. Thus, the increase in output and investments in these subsectors will result to increase in employment.

It is observed that with the increasing rate in population and in government consumption, the economy also grows. Since there will be an increase in population, the government consumption will also increase through public spending and providing social services to enhance the human capital needed for the service sector.

RECOMMENDATION

Based from the results of the study, the government may work to create policies that will improve the human capital needed in the service sector. This can be happened by upgrading the training programs in trade and repairs, BPO-IT industry, real estate, and other services. Moreover, the government may also increase the allocation of government spending in social services especially in education that will also added in the improvement of human capital. Further research studies are highly recommended which may use other variables such as human development index, level of education, and employment.

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LIFE AFTER DEBT: JOURNEY OF SELECTED ENTREPRENEUR-DEBTORS

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ABSTRACT

Entrepreneurs are recognized agents of economic growth and development. Their crucial roles are to create employment, generate wealth, provide goods and services, and help in eradicating poverty. The failure of the entrepreneur to recognize the important role played by external sources of finance usually poses serious challenges to their functions, and verily, the enterprises' sustainability as well. This study exposed the lived experiences of entrepreneur-debtors who have used credit as the oil to fuel the growth of their businesses. This purely qualitative study utilized the narrative inquiry route. It's focused on selected entrepreneur-debtors in the municipalities of Compostela, Liloan and Consolacion using the Collaizi Method of data analysis. The researchers are now living witnesses to the entrepreneur-debtors who courageously shared their lived experiences in the utilization of credit and presented that borrowing money for business, regardless how small it is, has something in store for the future of the business. From that, they were able to turn around their business, considerably improve asset utilization, shape their characters positively and make their enterprises grow despite the odds. Furthermore, this study provides insights and inspirations to those who have not experienced availing themselves of a sizable credit.

Keywords: Financial Challenges, Financial Success, Credit Facility,Debtor, Entrepreneur, Lived Experiences, Qualitative Research, Collaizi Method

INTRODUCTION

Credit is high octane for the economy. Credit accelerates business transactions. What productivity private investments make possible, an infusion of credit can multiply in quantum-fold. Credit plays a vital role in business finance as well as in the country's economic development.

According to DTI Sec. Ramon Lopez, an entrepreneurial nation gives the Philippines a good chance towards economic prosperity. Small entrepreneurial firms represent a large portion of the economy. These potential entrepreneurs facing capital shortage resort to credit which provides a major portion of the capital needed to jumpstart the enterprise.

Debt financing is commonly a pursued option of entrepreneurs, especially those who do not have enough money for capital. Borrowing money for sensible investment is better in long-term business engagement. It is a powerful tool when it is being used to fuel growth. Borrowing money becomes a problem if it is utilized for more than what a person needs. Poor use of credit can break a person because the capital and interest if left unpaid will make it harder for the debtor to get out of debt. Good use of it can make a difference in a person's life, especially if it is used as an investment. It is very challenging for potential entrepreneurs to decide whether or not to use credit in starting and maintaining the business.

Successful entrepreneurs borrow money for business even if they have extra money to maximize the use of money. Smart entrepreneurs will consider the difference between how much they can make versus how much it costs for them to borrow a reasonable amount for investment.

Debt financing is indispensable to entrepreneurs, especially those who do not have enough money for capital. Borrowing money for long-term use enhances business sustainability. It is a powerful energy that boosts growth.

The effect of debt financing on a firm's profitability is of considerable importance to an entrepreneur. Not very many studies have been conducted relating to this matter. Only success stories of entrepreneurs were heard while there were both triumphant and not so happy stories relating to overcoming challenges of availing credit in the pursuit of conducting a business. These stories are lessons waiting to be learned and give insights to aspiring potential entrepreneurs. This is the compelling reason why the researcher conducted the study on the lived experiences of entrepreneur-debtors who have availed of credit to support their businesses, and lived a radically different life thereafter.

STATEMENT OF THE PROBLEM

This research aimed to gain insights from the lived experiences of the selected entrepreneur-debtors in the Municipalities of Consolacion, Liloan, and Compostela who have availed themselves of credit in the conduct of their businesses.

In breadth, the study addressed the following specific domains of inquiry;

1. What are the various reasons for obtaining credit?
2. What are those lived experiences of the participants in the utilization of credit?
3. What are the insights gained in availing credit to support business?

RESEARCH METHODOLOGY

This study was supported by a qualitative research style assuming the Husserlian narrative inquiry route,extracting data on the lived experiences of the entrepreneur-debtors and how they managed their business- a distinctively phenomenological approach to doing educational inquiry. The research was conducted in three municipalities in the northern part of Cebu, specifically in the Municipality of Compostela, Liloan, and Consolacion. These municipalities are part of northern Cebu. Compostela, Cebu is located in the northeastern part of the island province of Cebu, Philippines. The main source of income is farming and fishing. Liloan is a home of a number of ceramics manufacturers. Now, they have many new commercial buildings and financial institutions.Consolacion is a first class municipality. It is 12.5 kilometers from Cebu City ("Consolacion", 2018). It is a progressive municipality. Several medium-size manufacturing industries are located in the said municipality, and sustained economic growth is expected in the years to come.

The credit providers of these three municipalities are rural banks, cooperatives, and commercial banks offering different types of loans.

The key informants of this study were the selected entrepreneur- debtors engaged in business listed from the licensing office of the Municipalities of Consolacion, Liloan, and Compostela for the past three (3) years and currently operating their businesses. The key informants were coded as Key Informant (KI-1 to KI-12) to uphold their anonymity.

The first key informant coded as KI-1, is above 46 years old and is married. She is a Certified Public Accountant and a Lawyer. She is part of the service industry for 20 years at the same time engaged in food business.

The second key informant coded as KI-2, is a 42-year-old married woman. She is an ophthalmologist by profession. She has been in business for more than three years in water refilling station and a franchised bookstore .

The third key informant coded as KI-3, is a 52 year- old married woman. She is Accountancy graduate and Bachelor of Laws. Engaged in general merchandise business for 22 years.

The fourth key informant coded as KI-4, is a 50- year old, widow, a graduate of Bachelor of Arts major in English. She has been in the Construction type of business for six years.

The fifth key informant coded as KI-5, is a 41 years old and is married. He is a Political Science graduate and Bachelor of Laws. He is engaged in the Real Estate Business for more than three years. The sixth key informant coded as KI-6, is 48 years old and married. She is a graduate of Bachelor of Elementary Education. She has been in the Pharmacy business for seven years.

The seventh key informant coded as KI-7, is 43 years old and married. He is a graduate of Political Science and Bachelor of Laws. He has been in Bakery and Water Refilling business for five years. The eighth key informant coded as KI-8, is 49 years old and married. She is a High School graduate. She has been in the Service Business for 30 years and seven years in general merchandise business.

The ninth key informant coded as KI-9, is single and 49 years old. She is a licensed pharmacist working in one of the Pharmacies located near her restaurant business. She has been in the Restaurant business for five years.

The tenth key informant coded as KI-10, is single and age between 36-45 years old. He is an Internal Medicine graduate and Dermatologist. He has been in the Wellness and Service business for 4 years.

The eleventh key informant coded as KI-11, is married and above 46 years old. She is a Secretarial Administration graduate. She has been in the Construction business for 5 years.

The last but not the least, is the twelfth key informant coded as KI-12, is married and above 46 years old. She is a graduate of Hotel and Restaurant Management. She has been in the Merchandising and Food Business for 16 years.

The main instrument in gathering the data were the researchers themselves. The researchers were the ones who conducted the interview; listened to the varied responses and analyzed the gathered data. Thus, it is deemed that the researchers became the main instruments in data gathering. However, the researchers were supplemented by an interview guide.

Ethical considerations are significant to qualitative research . It helps to determine the difference between acceptable and unacceptable behaviors ("Ethical Considerations",2018). To apply the principle of ethical consideration, the researcher sent informant consent before the interview was conducted. The key informants were informed of the general nature of the study. Their participation was voluntary and informations were coded to uphold privacy and confidentiality.

Data gathered were treated using the Collaizi Method. The researcher used the Collaizzi's steps to analyze the collected data in a survey or interview.

REVIEW OF LITERATURE

According to Oladele, Oloowokere & Akinruwa (2014) access to finance is a key determinant for business start-up, development and growth for small and medium-sized enterprises. Consequently, Thapa (2018) stated that companies utilize loans for various business purposes; such as for starting new business, expanding the business,and meeting seasonal business needs.

Based on recent studies, credit financing was necessary to startup firms and concluded that credit market plays an important role in the formation and development of a new business venture (Cole & Sokolyk, 2014).

Borrowed capital plays a significant role in the business as a factor of production (Dombrovska, 2016). Further, the borrowed capital was used for business expansion, acquisition of additional assets and investments.

Panigrahi (2018) capital was the scarcest productive resource in the economy and proper utilization of capital improves the efficiency of production. Capital can be internally sourced from ploughed back retained earnings, but this is seldom sufficient for expansion (Weli, 2014). However, the recent money glut has served as a boon to budding entrepreneurs. Money is piling up in bank coffers as evidenced by the very low interest rate banks are paying to their depositors.

FINDINGS

Table 1. Emergent Theme: Need for Capital

SUB-THEMES	KEY INFORMANTS
Working Capital	KI-1,KI-3, KI-4, KI-5, KI-11
Start-Up Capital	KI-7, KI-8, KI-10,KI-12
Additional Capital	KI-2, KI-6, KI-9

All key informants' reasons for obtaining credit were for the support of the operation of their respective businesses. Five of the key informants used credit for working capital; four key informants used credit for start up capital and three key informants used credit for additional capital.

Entrepreneurs obtain credit for a variety of reasons. Obtaining credit is one way of financing business operations. Entrepreneurs seek funding for capitalization of their businesses. At some point of their business undertakings they need funding to support their operations and to improve organizational efficiencies.

Table2. Emergent Theme: Lived Experiences in Utilization of Credit

SUB-THEMES	KEY INFORMANTS
Sustainability of Working Capital	KI-1, KI-3, KI-5, KI-6, KI-8, KI-9, KI -11
Acquired Start-Up Capital	KI-2, KI-3, KI-7, KI-8, KI-10, KI-12
Additional Investment (increase capitalization)	KI-1, KI-3, KI-4, KI-7, KI-8, KI-9, KI -10, KI-12

Table 2 shows the responses of the key informants based on the interview question when they were asked on their lived experiences in the utilization of credit. Majority of the key informants revealed that credit has benefited their businesses by providing capital, most as working capital, next as start- up capital and additional capital.

Seven key informants have benefitted the use of credit by having additional working capital used in day to day operation of their businesses. It would be difficult for the business to move forward without keeping up the working capital. Working capital is the most powerful machinery that runs the business and improves cash flow and growth of the business. Indeed, capital can be seen as the lifeblood of the business for in its absence, it is difficult to continue. Oyedokun & Somoye (2018) providing finance for the working capital, which is concerned about the issues affecting day-to-day management and finance of the business are very essential. Access to finance is important to maintain funds for working capital to meet the immediate needs of the business.

Six key informants have revealed having benefited the use of credit in business by having a capital to start a business. Key informant 7 has acquired capital based on credit and has learned to observe paying obligations on time so that interest and payments will not be piled up.

Starting up a business is a dream of many, including all the key informants. Firms need finance for start-up capital (Ndede, 2015). Entrepreneurs raise money for start-ups by acquiring debt (Oranburg, 2016).

Eight key informants shared commonalities in their utilization of credit by having additional capital for purchase of new equipment and acquisition of other resources essential for business operations.

Thus, external borrowing is important to increase capital to meet financial needs. When capital is increased through borrowed capital, the entrepreneur can meet the demands of the customer. Hence, increased capital is increasing sales. All key informants were able to acquire the necessary capital for their businesses and they have revealed the positive effects of credit in their businesses.

Key informant 1 responded "Yes, it enables me to expand and sustain my business".

All key informants were able to acquire the necessary capital for their businesses and they have revealed the positive effects of credit in their businesses.

Table 3. Emergent Theme: Insights Gained in Availing Credit to Support Business

SUB-THEMES	KEY INFORMANTS
Increase credit advantage	KI-11, KI-12
Increase Sales	KI-6,KI-9, KI-12
Increase Employment	KI-4, KI-7

Table 3 presents the responses of the key informants on the effects of credit in their businesses. Other key informants have highlighted some additional positive effects that credit has done to their business. Some have increase credit advantage, increase in their sales and generate more employment.

Loans are increased if clients pay his obligation regularly. Key informant 11 disclosed that the benefit she has availed in utilizing credits was that she always has easy access of loan from banks because whenever she has money, she practiced paying her loans right away so that she can borrow immediately from the bank whenever she will run out of money and establish good credit standing.

The response of key informant 6 when asked about the effect of credit in her business "My capital has been increased, in effect, my sales are increased" and key informant 6 also stated that she had increased her sales when she has acquired capital from his availed credit. Three key informants have benefitted credit by increasing their sales.

Business organizations managed by entrepreneurs constitute a major component of the whole economy for they create employments. Chukwuma (2017) argued that one of the social impacts of credit is the ability to generate employment if it is properly used. The good use of credit would enable the entrepreneur to hire people to work with him in the business to further maximize productivity. Two key informants said that credit has increased employment as the positive effect of his availment of credit.

One of the key informants said that credit had increased his capital, thus allowing the entrepreneur to increase employment, which in turn increased the capacity to handle increased business volume. All informants know of some other entrepreneur who misused credit and has placed the entrepreneur in a host of situations of misery and bane.

CONCLUSION

Entrepreneurs need capital to support business operations. They can finance their operations using internal funds, and through credit. Based on this study, credit has a prodigious role in generating entrepreneurial activities because it has helped start-up a business, maintained working capital efficiency, sped up the growth of the business, and improved the standard of living of the entrepreneurs.

Credit fueled growth of their business, increased profitability and helped in employment generation thus elevating the standard of living of the entrepreneur and the society as a whole. Obtaining credit is a viable option to the entrepreneurs, especially those who have no capital to start a business, although this is not the only factor to be considered in starting up a business.

Prior to obtaining credit, entrepreneurs must be equipped with business knowledge, sound financial management, and most especially hard work.

RECOMMENDATIONS

On the basis of the study, the following are highly recommended:

Entrepreneurs should study the different products offered by the various financial institutions where they can access credit for their businesses.

They should update themselves to different government agencies offering assistance to entrepreneurs in the promotion and development of their businesses. They should seek assistance from the Department of Trade and Industry for financial institutions offering low interest or receive funding when this becomes available.

They should attend seminars on financial management because financial literacy can help a lot to ensure that entrepreneurs invest wisely, manage their budget, and know how to systemically accumulate wealth for reinvestment.

The development of entrepreneurial values early in life can help entrepreneurs equip themselves in facing challenges in business undertakings. Positive entrepreneurial values should be ingrained early in life. Aspiring entrepreneurs must also be encouraged to establish bank relations early in life not only to establish long standing bank relations but also for developing savings and frugality values and credit worthiness.

Entrepreneurs must equip themselves with the knowledge peculiar for the operation of a specific business, like knowledge of agriculture if the entrepreneur goes into farming business, or the like.

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α,β,γ,… OF MATHEMATICS PROFICIENCY: CONSTRUCTS OF EXCELLENCE BY HIGHLY MATHEMATICAL PROFICIENT

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ABSTRACT

Proficiency in Mathematics is acquired over time. Each year they are in school, students ought to become increasingly proficient. Many researches have ventured on studying the poor performance and low proficiency of learners in Mathematics. However, none, if not few, have focused on the positive side of this issue in Philippine education. This study is a qualitative research that focused on the constructions of excellence by highly mathematical proficient students. It used social constructivism perspective as a lens in developing a grounded theory that focused on the constructions of excellence of highly mathematically proficient learners. Participants were 16 learners who had been identified to have high proficiency in Mathematics and who were interviewed focusing on the central question: "How do individuals develop their high proficiency in Mathematics?" A theoretical model was developed describing the (a) causal conditions that makes the learners strive to be proficient in Mathematics; (b) high mathematical proficiency as the central phenomena; (c) intervening conditions or intrinsic factors contributing to their proficiency; (d) context or extrinsic factors contributing to their proficiency; (e) cognitive, behavioral and metacognitive learning strategies they used to develop their proficiency; and, (f) consequences which is their benefits on having high proficiency in Mathematics.

Keywords: high Mathematics proficiency, grounded theory, cognitive, behavioral, metacognitive

INTRODUCTION

Proficiency in Mathematics is acquired over times. Each year they are in school, students ought to become increasingly proficient. For example, Grade 3 pupils should be more proficient with the addition of whole numbers as compared than when they were Grade 2. Students need time to engage in activities around a specific mathematical concept if they are to become proficient with it. To become proficient, they need to spend sustained periods of time doing mathematics.

Literature Review

Just like any other skill, everyone has the ability to learn Mathematics, although some children learn and make connections faster than others. Everyone possesses some mathematical ability, but some children have potential far beyond expectations. Mathematical abilities in a child are often latent and remain unnoticed both by the child and his or her teachers. This potential can be lost forever if it is not discovered and supported at the appropriate time and may even be undermined by inappropriate experience. Different mathematical traits and abilities appear at different ages and one must tap into these at appropriate times. There are periods in a child's development when he or she responds to formal procedures and algorithms, and there times when they can be excited by the discovery of a new mathematical activity.

Matching a talented child's mathematical experience to their cognitive development is a challenge for every teacher since every child will be different. However, most also attribute excellence to self-willingness to learn and develop such skills. According to Azikiwe (2008), good study habits are good asset to learners because they (habits) assist students to attain mastery in areas of specialization and consequent excellent performance, while the opposite constitute constraints to learning and achievement leading to failure. A research conducted by Good (2006) defined the term study habits as the student's way of study whether systematic, efficient or inefficient etc. Study habits are perceived to be the determinants of the academic performance, hence, efforts are made to develop and improve study habits in stu-

dents. Same result was found out from the study of Utanes (2014) while Ikegbunam (2008) revealed that patterns of sex differences is present in Mathematics learning.

The conceptions, attitudes, and expectations of the students regarding mathematics and mathematics teaching have been considered also to be very significant factor underlying their school experience and achievement (Borasi, 2000; Howard, 2008). Further, based on the study on the "Roles of Attitudes, Perceptions and Family Backgrounds on Students Achievement in Mathematics", student engagement in mathematics plays a key role in the acquisition of math skills and knowledge – students who are engaged in the learning process will tend to learn more and be more receptive to further learning. Student engagement also has an impact upon course selection, educational pathways and later career choices (Leder, 2003).

On the other hand, learning strategies refer to student's self-generated thoughts, feelings and actions which are systematically oriented toward attainment of their goals. A learner could use combinations of these learning strategies depending on his style and capability to learn Mathematics. It must also be emphasized that Mathematics is not a field that exists in isolation. Students learn best when they connect mathematics to other disciplines, including art, architecture, science, health, and literature. Such connections help students develop an understanding of the academic vocabulary required to "do mathematics" and connect the language of mathematical ideas with numerical representations (Protheroe, 2007).

Locally, many researches have ventured on studying the poor performance and low proficiency of learners in Mathematics. These researches focused on identification of learning difficulties, diagnosis of mathematical misconceptions, prediction of performances given some factors, determining reasons of poor retention, assessment of existing curricula and others. However, few have focused on the positive side of this issue in Philippine education.

Objectives of the Study

Thus, I was motivated to conduct a qualitative study with a primary purpose of presenting a grounded theory that focused on the constructions of excellence of highly mathematically proficient learners.

General. Using social constructivist perspective as the lens, my theoretical orientation in the views or perspectives of individuals was grounded on the central question "How do individuals develop their high proficiency in Mathematics?"

Specific. Specifically, it sought answers to the two sub-questions being as to the respondents of this study: (1) What do you do to attain good performance in Mathematics?; and, (2) Tell me more stories about you and Mathematics (your class, your teacher, your parents and friend, your aspirations, your achievements).

METHODOLOGY

Participants. Research participants were 16 students with ages ranging from 13 to 20 years old, who had been identified to have high proficiency in Mathematics. It consists of 11 female and five male students. What is common among the participants was their exposure to Metrobank-Mathematics Teachers Association of the Philippines competition during their elementary up to high school years in which some of them were achievers or placers in the said competition.

Data Collection. A letter was delivered personally to the head of the schools stating the purpose of the study. Upon approval, the letter was endorsed to the Mathematics advisers for the identification of the participants. These participants were then furnished with the consent forms and were briefed about the purpose, risk, benefits and confidentiality of the study. Interviews were conducted on November 14 and 20, 2017. Each of the participants was subjected to one-on-one interview that last for 25 to 45 minutes each. In an unstructured open-ended interview, two general questions were asked: "What do you do to attain good performance in Mathematics?" and "Tell me more stories about you and Mathematics (your class, your teacher, your parents and friend, your aspirations, your achievements)." The interview was guided by an approved interview protocol and script. My responses included active listening, empathetic reflection and minimal witticisms.

Data Analysis. Analysis began with unfocused transcriptions paired with cool analysis (partial analysis to each interview) on the videotaped interviews. Inductive approach was used to develop the themes. Open codes were generated by cutting and sorting processing technique. The language of the participants guided the development of the codes and category labels known as in vivo codes. From these partial analyses, word co-occurrences were identified. These categories were then again sorted, compared and contrasted until saturation and classified into themes which

were arranged to develop the model for the grounded theory.

Report writing. Inductively, the grounded theory was developed and presented in a diagram by (a) analyzing the narratives of the participants' experiences, (b) developing codes, categories and themes rather than imposing predetermined classifications of responses and (c) generating final analysis and generalization which led to the development of the grounded theory. The themes are placed in the model through the following criteria: (a) category's centrality in relation to other categories, (b) frequency of category's occurrence, (c) its inclusiveness and the ease with which it related to other categories and (d) clarity of its implications for a more general theory. To establish validity of data, I used axiological philosophical assumption in which I openly discussed the experiences that shaped the narrative and included my own interpretation in conjunction with the interpretations of the participants; that is to establish local coherence. Data were also combed to ensure saturation and theme coherence.

RESULTS

The grounded theory model for the constructions of excellence by highly mathematical proficient students, evolving from Strauss and Corbin's (1990) framework that was developed from this study is evident in Figure 1.

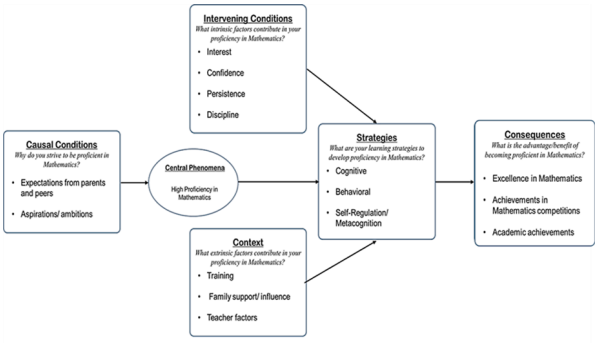

Figure 1. Theoretical Model for High Proficiency in Mathematics

Causal Conditions of Becoming Highly Proficient in Mathematics

After hearing the students' stories through unstructured interview, a general question, "Why do you strive to be proficient in Mathematics?" has been developed to facilitate development of codes that will reflect the causal conditions that makes a student highly proficient in Mathematics. Two causal conditions emerged from the findings of this study: a) expectations from parents and peers; and, b) aspirations or ambitions.

At least 4 of the students wanted their parents to be proud of them thus they strive to achieve well in their studies. One of the respondents said, "My parents are proud if I have an achievement [especially in contest], therefore I really strive. I don't want to waste their sacrifices for me." Some, especially the senior high school and college respondents told that they get their motivation from the trust they get from their classmates in which they say that they are the one whom their classmates know who could solve a difficult exercise given by their teachers. Further, attributed from the fact that most of them belong to average-earner families, their parents hope that they could alleviate their socio-economic status after they will finish their studies. A special case was from a respondent who is a son of single mother. Probing him that what if the story was different and his father did not leave them, he replied, "Maybe it will be lower because when we lost him, it motivated me to strive since I am the only hope that our family have got. That is why I need good performances and finish as well."

In addition, the students also develop their aspirations which become the second causal condition. Respondents form the high school want to pursue engineering or accountancy courses. Five of the college respondents are taking Bachelor of Secondary Education-Major in Mathematics and one is taking Bachelor of Science in Business Administration. Asked why choose those courses, most of them replied, "It's where I could apply my skill in Math…it will really help if as early as now, I need to focus studying Mathematics."

Central Phenomena Emerging from the Causal Conditions

This study focused on the concept of high mathematical proficiency. It is apparent that in general, the students need high proficiency to achieve better and live up with the expectations of their parents and peers. Specifically, they also need high proficiency on the subjects related to their ambition and future career plans, which is Mathematics.

As the central phenomena, high proficiency in Mathematics was the main topic and focus of the study and the discussion of its results. The respondents of this study were theoretically sampled, that is, they homogenously sampled. Respondents were identified by their advisers as highly proficient in Mathematics in which the students confirmed. Apparently, the students have

grades ranging from 94% to 98% which fall on the bracket "with high honors" (based on the K to 12 ranges for awarding recognition to students).

Intrinsic Factors: Intervening Conditions of High Proficiency in Mathematics

To achieve high proficiency in Mathematics, the students have developed their strategies. However, most of the students pinpoint first the following intervening conditions that could also contribute in achieving high proficiency on the said subjects in which I then identified as intrinsic factors: a) interest; b) confidence; c) persistence; and, d) discipline.

The first intervening condition is interest. The respondents said that when it comes to their Math class, they feel excited. One of them jokingly said, "Even Math is too tough on me, I still love him too much." They developed already the passion of learning Mathematics in which "…the point wherein, you don't need someone to push you to learn it. You should have the self-will." They have also already set Mathematics as their priority subject.

Confidence also contributed to their high proficiency in Mathematics. Asking them in a scale of 1 to 10, 10 as the highest, in average, the respondents rated their confidence as 8 when it comes to Mathematics reasoning out that they still have something more to learn and they are will to learn them. Aside from MTAP, most of them also participated Science Fair competitions on Investigatory Project and Quiz Bee categories while few also engaged themselves in Dance troupes and Journalism (broadcasting, editorial and sports writing) which may have added to their confidence. Three of the respondents, two from SHS and one from college, said that since they are exposed to a non-Math track/ course, their confidence as well as their knowledge in Math did not improve, they believe that they have better proficiency when in the JHS.

Persistence is the third intervening condition which is portrayed by one of the respondents as: "Don't think of Math as a difficult subject, if you do so, then you will end up learning Math more difficult." They said that it is wrong that other students usually give up when exposed to difficult exercises. These, as they said, may be brought out by their fear to commit mistake. "Embrace your mistake because it is the only way you could learn to solve that Math problem."

Lastly, discipline is also a great contributor to achieving high proficiency in Mathematics. "If there is no discipline, you won't be listening to your teacher [and miss your classes], and therefore, there will be no learning at all." They emphasized that discipline is needed to focus in learning. Reviewing every night and during leisure time will help freshen up lessons for the next day. One respondent said that "fifty percent" is the share of self-discipline in the development of her proficiency in Math.

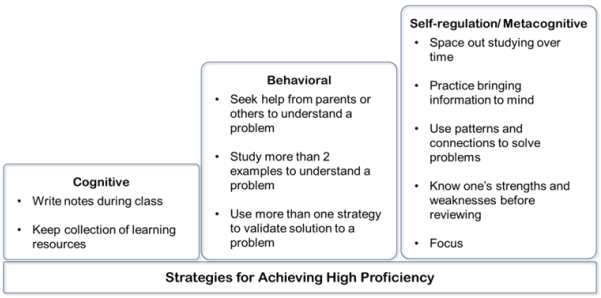

Figure 2. Learning Strategies of Students with High Mathematical Proficiency

Extrinsic Factors: Context in which High Proficiency in Mathematics is Developed

In addition to the intervening conditions, extrinsic factors also contribute in the development of the high mathematical proficiency of the students. These extrinsic factors are: a) training; b) family support/ influence; and, c) teacher factors.

All of the respondents were exposed to MTAP competition during their elementary up to high school years in which some of them were achievers or placers in. They have undergone training through MTAP Saturday classes. They said that in the training, they learned shortcut methods in solving difficult Mathematics problems and has been able to learn lessons in advance as compared to their regular classes. Most of them also said, "It's enjoyable. It enhances mathematical ability and boost confidence."

Family support is also a critical contributor to achieving high proficiency in Mathematics. Although the students confirmed that the most common support from their parents is through financial aspect, most of them said that, "they helped me in my assignments and advanced studies during elementary." This means that their parents laid good foundational knowledge which is very useful for them at present. Encouragements and idolizing are also common among the students. They said that their brothers, sisters and cousins were also good in Mathematics and that influence and motivated them to learn it better also.

The students also cite the importance of support coming from the teachers and the school administration. One student believes that having a

friendly teacher whom you can tell your problems, could also help because you won't hesitate to approach him if ever you don't understand something. While the other said, "If the teacher is good and knowledgeable, there is a higher tendency that his students will learn even if they are not good in Math, especially if they have patience in teaching." They also highlighted and appreciated the efforts of their teachers who check if they really understand their present topic before proceeding to the next.

Strategies for Developing High Proficiency in Mathematics

In the presence of the context and intervening conditions, the central phenomena led to the development of three core strategies of the students: a) cognitive; b) behavioral; and, c) self-regulation or metacognition as presented in Figure 2. It is apparent that among these three strategies, self-regulation or metacognition is the most dominant.

Cognitive. Under cognitive strategies, the students (a) write notes during classes and (b) keep collection of learning resources. All of them emphasized the advantage of taking notes, citing its importance when studying or reviewing for a test. They further said that they only take note of important details such as definitions, formulas and examples. One of the students said, "It's what you really need, without the formula, you won't be able to solve a Math problem…It is the foundation, from it you can deduce and research sample problems and try to solve them."

Aside from the books provided by the school, some of them also possess collections of books in Mathematics, mostly hand-me-down books from graduated relatives. One of them said, "Reading books is the best way to have advanced study… If information from books is not enough, you could search the Internet." They also consider Internet as a good learning resource but still prefer books since they believe that they contain more reliable information. Some of them are also fond of using cellphone applications that focus on Mathematics such as soduko, Math-based online quizzes and the like while some also consider watching documentaries on television. One respondent says, "… in Discovery Channel. They present different calculations about rocket engineering…there is also Math but it is integrated only."

Behavioral. In terms of behavioral strategies, the students usually (a) seek help from parents or others to understand a problem; (b) study more than 2 examples to understand a problem; and, (c) use more than one strategy to validate solution to a problem.

It could be recalled that parental support is one of the extrinsic contributors to high proficiency in Mathematics. In addition to that most of the respondents also said that during their elementary years, their parents help them in their assignments and advanced studies which laid good foundational knowledge for them to learn Mathematics. Some of them also seek help from their siblings, relatives and other students who are ahead of them in which one of them said, "Actually, I approach the Grade 10 students for my assignments." On the context of their MTAP training, one student, which is also parallel to the responses of the others, said, "In MTAP, we share each other's knowledge on how to arrive in correct answers efficiently and effectively. We share each other our 'diskarte'." One student also pinpointed that, "We don't only learn from self- study, we need the advice of our teachers because they know better."

The students also pin down that having analytical skills will help a student understand and apply mathematical skills. "You need to analyze first the Math problem before trying to solve it… try finding similar problems and solve the given problem using the strategy used in that similar problem you have found." Most of them usually read books and try to solve the sample problems to master the process involve in it.

The students also said that having "diskarte" is needed in which their teachers have taught them. One student said, "There is a need to learn fast and effective techniques especially if engaged in a contest…you must also have your own technique based on what the teacher have taught… analyze and not only memorize." This implies that using one or more strategy is needed when dealing with Math problems to validate solutions.

Self-regulation or Metacognition. Most of the respondents' strategies were classified under self-regulation or metacognition strategies. Specifically, these strategies are: (a) space out studying over time; (b) practice bringing information to mind; (c) use patterns and connections to solve problems; (d) know one's strengths and weaknesses before reviewing; and, (e) focus.

When it comes to spacing out study over time, finding time to relax help you to study better is the belief of the respondents. "Give yourself time to relax, refresh and unwind. Just enjoy your classes even if it is difficult…give time also for your physical well-being, you can play sports." They emphasized that a relaxed environment is more

conducive for learning since it will be "boring if it is too serious."

Developing a habit of reviewing every night, according to most of the students, could help you "enhance and refreshes understanding of a learned concept." Most of them also study in advance the activities in their books, trying to solve the Mathematics problems long before they could tackle them in the class. One of the strategies of one student is "solve again the given example I have taken in my notes and deduce the process how to arrive at the correct answer."

Establishing connections of Math concepts to real life must be done so that "it would be easier for the formula to be internalized and memorized." They said that by internalizing the formula through applications, you could be able to derive it whenever you have forgotten it. Another student affirmed, "If I am studying Math concepts, I like it more when it is in a form of real life situation because it makes me more engaged and understand it easier.

Knowing one's strengths and weaknesses is one of the main features of metacognition. The students said that their purpose of reviewing is to "go back to what transpired that day". One of the respondents continued, "Especially on lessons that I did not understand…anyway I have notes, thus I could re-study the process involve in the concept." Furthermore, all of them mentioned that focus is needed when learning with Mathematics. Balancing time for relaxation and study is a must in which parallel to what others said, one of them acknowledged, "study time is study time, relax time is different."

Consequences of High Proficiency in Mathematics

The consequences consist of advantages and benefits of the students as a result of being highly proficient in Mathematics which is portrayed mainly by their achievements. These are: a) excellence in Mathematics; b) achievements in Mathematics competitions; and, c) academic achievements.

The high school respondents were having "high honors" (grades of 94 to 97) when it comes to their achievement in the Mathematics subjects while the college students as well are identified as having no grade lower than 92 when it comes to Mathematics subject. Exposed consistently to MTAP Competitions, the respondents qualified in the Division Orals and mostly lands on the Top 10 place. Furthermore, the high school respondents are top ranking students (1st to 3rd) while the college students avail academic scholarships as well as academic awards (Dean's List) and are vying for Latin Honors.

DISCUSSION

This study is distinctive as it focused on the positive side of the issue on the problems in Mathematics by aiming to develop a grounded theory about having high proficiency in Mathematics. The model depicts the central phenomenon: high proficiency in Mathematics and the following aspects:

1. Causal conditions. Why do you strive to be proficient in Mathematics?
2. Intervening conditions. What intrinsic factors contribute in your proficiency in Mathematics?
3. Context. What extrinsic factors contribute in your proficiency in Mathematics?
4. Strategies. What did you do to you become proficient in Mathematics?
5. Consequences. What is the advantage/benefit of becoming proficient in Mathematics?

Causal conditions, context, intervening conditions and consequences of high proficiency in Mathematics

One of the causal conditions is concerned with parental involvement. Parents cannot be blamed on their high expectations on their children especially they themselves were also trained to meet expectations. This phenomenon is somewhat common to parents who are professional. The students with high proficiency in Mathematics were expected to meet those demands from their parents.

This causal condition is parallel to one of the context, family support or influence. It can be gleaned that this is one of the extrinsic factors that contribute to their proficiency in the subjects. They are properly supported by their parents and also "idolized" their siblings and cousins to perform well in Mathematics. Studies show that parent involvement does indeed have a positive impact on student achievement in Math (Cotton and Wikelund, 1989; Sheldon and Epstein, 2005). But to maximize the impact of that involvement, the parent-student interaction should go beyond helping the child with her or his homework.

Another causal condition is the students' aspirations or ambitions. This condition can be projected to the intervening variables interest and persistence. A student's motivation and degree of

interest is a significant factor that influences learning (Hidi & Harackiewicz, 2000). This implies that when one is motivated by his or her aspirations, he could develop the interest to learn the subject and shall be persistent in attaining it. In this case, this study found out that the students wants to pursue courses or careers that are related to Mathematics and thus developed their interest and persistence to learn the subject. Motivation is among the most powerful determinants of students' success or failure in school (Hardre et al., 2007). Therefore, a student's own lack of interest can deter understanding (Koller, Baumert, Schnabel, 2001).

Training as a context, on the other hand is connected to the intervening conditions confidence and discipline, an intervening condition. It can be recalled that the students regarded that they develop high confidence with the subject as a result of their consistent training in the MTAP classes and competitions. Successful learners are not only confident of their abilities. They also believe that investment in learning can make a difference and help them to overcome difficulties – that is, they have a strong sense of their own efficacy (PISA, 2003). Further, it could be pointed out that having discipline will contribute to higher concentration on studying the subject. Mathematics requires proper discipline and adequate concentration to understand its concepts.

A comfortable atmosphere where students feel free to ask questions is conducive to learning (Bain, 2004; Kealoha, 2006; Middleton & Spanias, 1999). Schweinle, Meyer, and Turner (2006) suggested that a positive classroom climate promoted engaged learning. This is the main implication for the context "teacher factors". It could be gleaned that the students want a teacher who could break the monotonic seriousness in a Mathematics class. It actually eases the pressure and reduces the anxiety of the learners. In addition, they also need a teacher who is knowledgeable to teach the subject.

Strategies of students with high proficiency in Mathematics

Emerging from the central phenomena, the core aspect of this study is the strategies of the students with high proficiency in Mathematics. To give meaning on to it, a question is formed which reflects the said strategies: What do you do to become proficient in Mathematics? As can be gleaned from the results, self-regulation or metacognition has the highest frequency of categories followed by behavioral strategies and lastly, cognitive strategies.

The categorization was adapted from the definition of Warr and Allan (1998) on the three general classifications of learning strategies. Cognitive strategies refer to skills in rehearsing a material to be learned or organizing it into a main them and behavioral strategies refer to the preferences for seeking help from others, for trial and error or for written instructions while self-regulating or metacognition refers to controlling emotions, motivation and comprehension.

The cognitive strategies of the students are writing of notes and keeping collections of learning resources. They can be viewed as elaboration or rehearsal techniques which are related to individual learning tasks, operating directly on incoming information, manipulating it in ways to make cognitive progress. The students apparently treat new information, especially formulas and concepts that are freshly acquired, as very important thus they take note of it. They use these information to gather additional knowledge from diverse learning resources such as books, Internet or television viewing.

This further reflects the students' strategies in processing new knowledge, which is an aspect of cognition. Furthermore, of the five strands of mathematical proficiency developed by National Research Council (NRC, 2001), conceptual understanding is the main concern of cognitive strategies. That is, from the responses of the students, it can be implicated that they use these strategies to build their curiosity as well as reactivating their stock knowledge in connection to the acceptance of the newly acquired knowledge.

Three categories belong to the behavioral strategies of the students. They seek help from parents or others or study more than two examples to understand the problem. In addition to that, they also use one strategy to validate solution to a problem. These strategies are mainly concerned with the two strands of Mathematics proficiency: procedural fluency and strategic competence. These strategies therefore are concerned with developing the students' skills in carrying out procedures flexibly by finding ways to come up with a solution including seeking help from others. It is apparent from the results of this study that the students mainly get help from their teachers as they perceived her to be the most knowledgeable about it. By studying more examples and focusing on the pattern of the process of their solutions, the students can come up with an accurate, efficient,

and appropriate tactics to attack a particular Mathematics problem.

They also boost the students' ability to formulate, represent, and solve mathematical problems effectively. This is evident in the students' ability to research, evaluate and use more effective strategies other than what their teachers have taught them. As students with high proficiency in Mathematics, their capability to make and apply their own "diskarte" is considered as distinct from other students.

Self-regulation or metacognition is the most applied strategy of the students as apparent to the five categories under it. From the responses of the students, it could be gleaned that their responses actually develop the last two strands of Mathematics proficiency: adaptive reasoning and productive disposition. Through these strategies, the students improve their capacities for logical thought by practicing bringing information to their minds. They use patterns and connect mathematical concepts to real life situations to explain and justify solutions to the Mathematics problems they encounter. They can also reflect so that they would know their strengths and weaknesses. These are reflective of the adaptive reasoning strand of mathematical proficiency.

Having focus yet spacing out study over time is reflective of the productive disposition strand. The students have apparently developed their habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy. This is supported by the fact that they also connect mathematical concepts to real life situations. They developed their focus yet they also believe that giving time to relax to one's self is necessary to freshen up and unwind.

CONCLUSION

The strategies used by students with high proficiency in Mathematics plows back to the development of the five strands of Mathematics proficiency. The cognitive strategies develop the conceptual understanding of the students. The behavioral strategies boost their procedural fluency and strategic competence. The self-regulation or metacognitive strategies enhanced their adaptive reasoning and productive disposition. It is therefore concluded that high proficiency in Mathematics could be achieved by developing up these intertwined and interdependent strands of mathematical proficiency by employing cognitive, behavioral and metacognitive strategies.

It could be noted also that both intrinsic and extrinsic factors contribute to the development of high proficiency in Mathematics. Intrinsic factors such as interest, confidence, persistence and discipline comes from within the students. This could be attained by developing self-motivation to learn Mathematics. Extrinsic factors include consistent exposure to trainings related to Mathematics, family support and influence and teacher-related factors which are belonging to the context where a student learn Mathematics.

Implication for future researches. The results of this study, the theoretical model of the constructs of the students with high proficiency in Mathematics, can be used as a paradigm in crafting a quantitative research that will validate the said model. Structural equation modelling (SEM) is one of the suggested tools to be used to quantify the said theoretical model.

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IMPACT OF FINANCIAL LITERACY ON STRESS AMONG BUSINESS EDUCATION STUDENTS

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ABSTRACT

This study determined the influence of financial literacy on stress of the respondents. The descriptive-comparative-correlational method was utilized. The BSBA and BSOA students of the College of Business Education in North Luzon Philippines State College during the second semester, Academic Year 2017-2018 were the respondents. Stratified random sampling was used in the selection of sample. A 5-point Likert scale questionnaire was utilized in the gathering of data. Results shown is a high financial literacy; and typical stress experienced by the respondents. The BSBA students exhibited higher cash management literacy than the BSOA whereas the BSOA demonstrated better financial records and saving plan literacy than the BSBA. The older the student might be knowledgeable in cash management and financial records; and their over-all financial literacy becomes better. Students enrolled in the BSBA program tend to be more stressful than the BSOA program because of more financial-related subject in its curriculum. Correlation analysis revealed that a very satisfactory literacy in financial record might lead to be more stressful whereas when financial records literacy level is unfortunate might indicate a poor stress outcome. Consequently, the regression model presented as Stress = 2.404 + (-.347 x Cash Management) + (.285 x Financial Records) + (.175 x Savings Plan). A seminar on financial literacy and stress management is being proposed to improve the knowledge and skills in cash management of the students; faculty members are encouraged to understand the students' perception on the financial literacy dimensions and strengthen their awareness of the factors favorably affecting their learning situation. A Personal Finance subject be recommended as one Elective subject in the BSBA and BSOA curriculum that might address different issues raised by this study. Future researchers are encouraged to conduct similar study by using other variables such as academic achievements, and other courses.

Keywords: financial literacy, level of stress, regression model

INTRODUCTION

Financial literacy has been an interesting knowledge for so long considering its influence to individual economic life. Several studies about it have been conducted among students, employees and even entrepreneurs. Klapper, *et al.* (2015) revealed worldwide that only 1-in-3 adults are financially literate but there are large variations among countries and groups. This is not only true in developing economies but also in countries with well-developed financial markets. Individuals with relatively boundless financial literacy also tend to have a few things in common, regardless where they live. Adults who use formal financial services like bank accounts and credit cards generally have greater financial knowledge, regardless of their income. Even unfortunate individuals who have bank account are more likely to be financially literate than who does not possesses bank account. Correspondingly, rich adults who use credit card generally have better financial skills than those who does not used. Financial literacy is *the ability to balance a bank account, prepare budgets, save for the future and learn strategies to manage or avoid debt* (Commonwealth Bank Foundation, 2004).

In a private university in the Philippines (Razafimahasolo, *et al.,* 2016), tertiary students possessed a moderate financial literacy, low stress and average academic performance. Furthermore, a very satisfactory financial literacy might lead to a poor stress and an excellent academic performance. Similarly, when financial literacy is poor, the stress outcomes may be great, and the academic performance may suffer. No significant

difference existed in stress when age, gender, and family income were considered. Cash management directly determines stress and academic performance of college students in a private higher education in the Philippines.

In neighboring ASEAN countries like in Malaysia, Albeerdy and Gharleghi (2015), investigated the factors influencing the financial literacy among university students. Correlation analysis and multiple regression analysis showed a significant relationship between education and money attitude towards financial literacy, while no relationship between financial socialization agents and financial literacy. Likewise, Idris, Krishnan, and Azmi (2017) examined the relationship between the levels of financial literacy and financial distress among Malaysian youths. Result reveals that the levels of respondents' financial distress and financial literacy were moderate. The study also shows a positive but weak relationship between financial literacy and level of financial distress. The implications points to the fact that the organizations concerned would do well to invest in human resources, in particular, with respect to personal financial management for their employees as such knowledge investment would help raise the level of financial literacy among employees and achieve the organizations' own objectives of high productivity. Ibrahim, e*t al.* (2009) also found that majority of the students are greatly deficient in their financial knowledge and precisely weak in money management skills. Nidar and Bestari (2012) revealed a poor personal financial literacy of students in Padjadjaran University, Bandung, Indonesia; and therefore, needs to be improved. The education of faculty, personal income, parent's income, and ownership of insurance affects their personal financial literacy.

Ergün (2018) studied that financial literacy among university students in eight Europian countries, namely: Estonia, Germany, Italy, Netherlands, Poland, Romania, Russian Federation and Turkey. Online survey instrument was used to collect data. It was concluded that a medium level of financial literacy about personal finance. Logistic regression indicated that male students, business major students, PhD students, those who live in a rental house, those whose parents have high level income, those who get advice on financial matters from their friends, those who took financial course before, those who get financial information about financial issues from university education, and students from Poland are more knowledgeable on personal finance. More financial courses should be provided in university education programs, which could help more students handle their finances better and improve their financial wellbeing. It should be taken into consideration that in recent years, environmental and technological influences on financial literacy may be more important than parental influence. In Australia (Xue, et al., 2016), measured the financial literacy of elderly Australians using Item Responses Theory. Lasso regression analysis found that younger, married males with higher income and greater net wealth are more likely to be financially literate. Better financial literacy is also associated with good health, higher educational attainment, better occupation and outright home ownership. Similarly, an average financial literacy among students in a regional university in Australia (Beal and Delpachitra, 2003). Logistic regression analysis revealed that those who got higher financial literacy were more likely to be male, specialized in business, more work experience, higher income, and poor aggregate risk preference. Both they are skilled nor knowledgeable in financial matters; and indirectly influenced their future through incompetent financial management.

In Israel, Shahrabani (2013) college students possessed poor financial literacy affected by their gender, nationality, class rank, work experienced and field of specialization. However, Ansong and Gyensare (2012) found that age, work experienced and mother's education directly related to financial literacy but not on father's education and work location, access to media and the source of education on money.

Jayaraman and Jambunathan (2018) concluded that financial literacy levels in India were to be lower than those in developed countries. Gender differences were found, with females outperforming males, contrary to findings in developed countries. Students who pursued the commerce/ economics stream of education were found to have higher levels of financial literacy than students pursuing the science stream. Results showed that students, despite having high levels of numeracy, were unable to transfer that knowledge to do financial computations. Parental involvement was also found to have a significant influence on financial literacy. Misra and McKean (2000) established time management behavior had a greater contribution on academic stress than leisure satisfaction activities. Females had more effective time. Freshmen and sophomore students had higher reactions to stress than juniors and seniors. Multivariate analysis discovered that anxiety, time management, and leisure satisfaction determine

academic stress. Hence, anxiety reduction and time management in conjunction with leisure activities might be an effective strategy for reducing academic stress of college students. In Taiwan, male students feel more stress than female; students with higher grades are more stress due to physical, mental, school and emotional factors; and students who availed loans were stressful due to physical, mental, school and emotional factors than those who do not (Kai-Wen, 2009).

Heckman, *et al.* (2014) proportion tests and multivariate logistic regressions recognized having enough money to participate with peers is not the most important financial stressors but rather expecting higher student loan debt upon graduation. This is an indication that students with high financial self-efficacy and confidence about the future are significantly less likely to report financial stress. Students in public institution of higher learning in Malaysia were reasonably stressed; and differ between at the beginning and middle of a semester but not between the beginning and middle with the end of the semester (Rafidah, *et al.,* 2009).

It is evident that studies along financial literacy and stress have been conducted to college students in higher education institutions. The aforementioned studies established a chronic knowledge in understanding financial matters (Razafimahasolo, *et al.* 2016; Ibrahim, *et al.* 2009; Nidar and Bestari, 2012; Xue, *et al* (2019); Beal and Delpachitra, 2003; Shahrabani, 2013). Similar findings came out in understanding the factors, effect and sources of stress in academic life of college students (Misra and McKean, 2000; Heckman, *et al.* 2014; Rafidah, *et al.* 2009).

This deficiency may also be crucial for Filipino college students especially now that poverty is the main reason why some did not enter into college education. However, others studied very hard making poverty as a challenge and not a hindrance to fulfill college diploma. Seemingly some students enjoy college life through the remittances from their families working very hard to sustain their family's needs for OFWs, education of their children is the outright reason. A question that might elaborate how they manage their financial situation in everyday life and the difficulties that hinder their academic endeavor. Nonetheless, no studies on Filipino college students' financial literacy and stress are available online except those papers that might be published in local research journal. Thus, the current study was conceptualized.

The theoretical insights of this study derived from theories and models that are relevant to the main problem of the study. The framework of this study was supported by Wisconsin's Model Academic Standards for Personal Financial Literacy (Burmaster, *et al,* 2006). Wisconsin's Model Academic Standards for Personal Financial Literacy is a statutory authority developed by Wisconsin Department of Public Instruction, responsible for developing a national standard curriculum, developing and administering national assessments, collecting, managing, and analyzing student achievement and other data, and reporting on school and system performance. Wisconsin's Model Academic Standards for Personal Financial Literacy is a new curriculum and a range of reforms to improve basic literacy and numeracy skills.

The Wisconsin Model Academic Standards for Personal Financial Literacy can help teachers work together to develop and implement curricula that will support students for life. Preparing young people to understand and actively participate in their own financial well-being is a vital personal skill. The economic stability of the communities and the resulting growth of the state's economy are influenced by personal financial literacy.

Accordingly, financial literacy is the ability to understand, to evaluate, and communicate information about money and financial services which includes the selection of appropriate financial options, the ability to plan for the future, and the capability to respond to life event and their effect on personal finance. Wisconsin's model confirmed that there is a natural link to financial literacy and stress level. Financial literacy is the excellent predictor of academic achievement as it is used to forecast level of stress. That is, a high financial literacy can support students to make correct financial decisions that will help sustain a lower level of stress. Conversely, college students who are not financially literate and do not possess a good understanding of basic financial concepts are more likely to experience a high level of stress.

STATEMENT OF THE PROBLEM

This study analyzed the effect of financial literacy on stress among business education students of North Luzon Philippines State College-College of Business Education in the Second Semester, Academic Year 2017-2018.

Specifically, it sought answer of the following questions:

1. What is the level of financial literacy and level of stress of the respondents?
2. Is there a significant difference between the level of financial literacy and level of stress of the respondents?
3. Is there a significant relationship between the following variables:
   3.1 profile and level of financial literacy and level of stress, and
   3.2 financial literacy on the respondent's level of stress?
4. Which among the financial literacy dimensions significantly predict the respondents' stress level?

METHODOLOGY

Research Design. The descriptive-correlational research method was utilized. Correlational research identified relationships among variables; and if relationship exists between two variables, it becomes possible to predict a score on either variable if a score on the other variable is known (Fraenkel and Wallen, 2003). This method was utilized to determine whether financial literacy is related to stress of the respondents; and attempted to identify which among the financial literacy dimensions significantly predict the respondents' level of stress.

Sample. The subject of this study comprised 326 college students from the College of Business Education, North Luzon Philippines State College who were enrolled during the Second Semester, Academic Year 2016-2017. Of the students in the sample, 75.8% percent were BSBA and 24.2% BSOA. There were 52.1% fourth year, 20.9% third and second year, respectively, and 6.1% first year students; majority (72.4%) were female and 27.6% male and the mean age was 20.15 years. In addition, 87.4% students in the sample were staying at home during their college studies receiving a mean daily allowance of ₱108.60. Stratified random sampling was utilized in the selection of samples.

Procedures. The study, which was approved by the VP for Administration, Research and Extension, was conducted in the Second Semester of Academic Year 2016-2017, and included a structured questionnaire which was distributed during the class and collected after 30 minutes giving those chances to verify items that are not clear to them before they responded on the questionnaire. Student could choose whether to or not to respond on the questionnaire nevertheless all of them willingly responded.

Instrument. The study, a structured questionnaire was utilized by means of five-point Likert Scale, adopted from the study of Razafimahasolo, et al. (2016). The questionnaire comprised of three parts as follows: Part I dealt with personal characteristics of respondents along course, year level, age, gender, residence, and daily allowance; Part II focused in terms of level of financial literacy with three dimensions, namely: a) cash management comprised of 15 items, b) financial records contained 15 items, and savings plan involved 12 items; and Part III of the questionnaire dealt with level of stress comprised of 25 items. The result of the reliability analysis using scale alpha was .93 for cash management; .95 for financial records; .92 for savings plan; and .83 for stress scale (Razafimahasolo, et al., 2016).

A five-point Likert Scale, 5 – 1 with answer options of "strongly agree" and "a lot" as 5, "agree" and "quite often" as 4, "undecided" and "occasionally" as 3, "disagree" and "seldom" as 2, and "strongly agree" and "never" as 1 were used in evaluating the respondents' level of financial literacy and level of stress, respectively. The following scale and norms were utilized for interpretation in the study:

Scale	Quantitative Rating	Level of Financial Literacy		Level of Stress	
		Item Rating	*Descriptive Interpretation*	*Item Rating*	*Descriptive Interpretation*
5	4.51 – 5.00	Strongly Agree	Very High	A Lot	Very High
4	3.51 – 4.50	Agree	High	Quite Often	High
3	2.51 – 3.50	Undecided	Average	Occasionally	Average
2	1.51 – 2.50	Disagree	Low	Seldom	Low
1	1.00 – 1.50	Strongly Disagree	Very Low	Never	Very Low

The frequency count and percentage described the current profile of the respondents; mean was determined the level of financial literacy and level of stress; t-test analyzed the differences between the financial literacy and stress of the respondents; Pearson Product Moment Coefficient of Correlation examined the relationship between the profile and the level of financial literacy and level of stress; and multiple regression analyzed and determined the which among the financial literacy dimensions significantly predict the respondents' stress.

FINDINGS

1. Financial Literacy and Stress of the Respondents:

Table 1 reveals that there is a "high" ($\bar{x}$ = 3.87) cash management literacy of the respondents. It could be explained further that it is important for the respondents to spend less than their daily allowance because they are capable of using their future earnings to achieve their financial goals and at the same time they understand the importance of personal financial management. In terms of financial records, the respondents achieved a "high" ($\bar{x}$ = 3.75) literacy rating because they can greatly compare carefully the cost of things they buy; they know how much allowance they would need; and they follow carefully their financial budget. Along with savings plan, the respondents reached a "high" ($\bar{x}$ = 3.75) literacy rating as supported by the fact that they understand why it is essential to save for future needs; they roughly how much they should save from their allowance; and whether or not they should become financially secured depends on their ability. Generally, the respondents have an overall "high" ($\bar{x}$ = 3.80) financial literacy as supported by their high literacy rating in cash management, financial records and savings plan.

The business education students generally have a great financial literacy, as compared in previous studies to college students in the ASEAN neighboring countries, United States, Australia, and other developed countries (Jayaraman & Jambunathan, 2018; Ergün, 2018; Idris, Krishnan, & Azmi, 2017; Razafimahasolo, et al. 2016; Albeerdy & Gharleghi S., 2015; Ibrahim, et al. 2009; Nidar and Bestari, 2012; Beal and Delpachitra, 2003; Shahrabani, 2013).

Table 1. Level of Financial Literacy of the Respondents

INDICATORS	RESPONDENTS				OVERALL	
	BSBA		*BSOA*			
	$\bar{x}$	DL	$\bar{x}$	DL	$\bar{x}$	DL
Cash Management	3.90	H	3.83	H	3.87	H
Financial Records	3.72	H	3.77	H	3.75	H
Savings Plan	3.78	H	3.82	H	3.80	H
GRAND MEAN	**3.80**	**H**	**3.80**	**H**	**3.80**	**H**

As gleaned in Table 2, there is an "average" ($\bar{x}$ = 2.86) level of stress among the respondents. Both the BSBA ($\bar{x}$ = 2.71) and BSOA ($\bar{x}$ = 3.01) college students were "occasionally" stress. It could be explained further that the respondents were occasionally stress when there are times they get easily feel tired or exhausted, experienced tension headaches, and when they tend to cry. Likewise, the respondents were seldom stressed when they have serious arguments with instructors, and when they tend to escape attending classes or lectures.

Generally, the state college students experienced a typical stress level similarly to students in Malaysian public institution of higher learning (Rafidah, et al. (2009); and as compared in preceding studies to college students in private universities in the Philippines, and neighboring countries (Razafimahasolo, et al. 2016; Nonis, et al. 1998).

Table 2. Level of Stress of the Respondents

Respondents	$\bar{x}$	DL
BSBA	2.71	O
BSOA	3.01	O
GRAND MEAN	**2.86**	**A**

2. Differences between the Financial Literacy and Stress of the Respondents:

Table 3 shows the significant difference in financial literacy of the respondents when group according to course. The findings showed that there is no significant difference in the mean score along a) cash management for BSBA ($\bar{x}$ = 3.9049, sd = .44198) and BSOA ($\bar{x}$ = 3.8254, sd = .53001) respondents; t(114.757) = 1.205, p = .231; b) financial records for BSBA ($\bar{x}$ = 3.7234, sd = .42932) and BSOA ($\bar{x}$ = 3.7733, sd = .54555) respondents; t(110.584) = 1.205, p = .459; and c) savings plan for BSBA ($\bar{x}$ = 3.7762, sd = .45567) and BSOA ($\bar{x}$ = 3.8163, sd = .59143) respondents; t(109.181) = -.553, p = .581. The results suggest that the BSBA students exhibited higher cash management literacy compared to BSOA students with a mean difference of .07942 whereas the BSOA students demonstrated higher financial records and savings plan literacy with a mean difference of -.04993 and -.04013, respectively.

Table 3. Significant Difference in the level of Financial Literacy of the Respondents Based on Course

Indicators	N	Mean	*sd*	*t*	*df*	*p (2-tailed)*	Mean Difference
A. Cash Management:				1.205	114.757	.231	.07942
BSBA	247	3.9049	.44198				
BSOA	79	3.8254	.53001				
B. Financial Records:				-.743	110.584	.459	-.04993
BSBA	247	3.7234	.42932				
BSOA	79	3.7733	.54555				
C. Savings Plan:				-.553	109.181	.581	-.04013
BSBA	247	3.7762	.45567				
BSOA	79	3.8163	.59143				
D. Overall:				-.061	108.277	.951	-.00386
BSBA	247	3.8015	.39176				
BSOA	79	3.8053	.51574				

As a whole, the findings reveals that there is no significant difference in the mean score for BSBA ($\bar{x}$ = 3.8015, sd = .39176) and BSOA ($\bar{x}$ = 3.8053, sd = .51574) respondents; t(108.277) = -.061, p = .951. BSBA and BSOA have the same level of financial literacy.

Table 4 shows the significant difference in stress of the respondents when group according to course. The findings showed that there is significant difference in the mean score for BSBA ($\bar{x}$ = 2.7143, sd = .67335) and BSOA ($\bar{x}$ = 3.0076, sd = .73447) respondents; t (122.760) = -3.151, p = .002. The results suggest that the BSOA students exhibited high stress level compared to BSBA students with a mean difference of -.29326. This could be explained further that the BSOA program have lesser number of financial-related subjects compared to BSBA program.

Table 4. Significant Difference in the level of Stress of the Respondents Based on Course

Indicators	N	Mean	*sd*	*t*	*df*	*p*(2-tailed)	Mean Difference
BSBA	247	2.7143	.67335	-3.151	122.760	.002	-.29326
BSOA	79	3.0076	.73447				

3.1 Relationship between the Profile and level of Financial Literacy and Stress:

Table 5 reveals the correlation data between the profile and respondents' financial literacy. Result of analysis showed that the profile year level is correlated with cash management (r = .112, p = .05); age is correlated with cash management (r = .120, p = .05), with financial records (r = .112, p = .05), and overall (r = .118, p = .05). The correlation coefficient were positive indicating that the older the student, the dimensions cash management and financial records and the whole financial literacy level also rises. Ansong and Gyensare (2012) supported the finding of the study.

Table 5. Result of Correlation Analysis between the Profile and the Level of Financial Literacy of the Respondents

PROFILE	FINANCIAL LITERACY			OVERALL
	Cash Management	*Financial Records*	*Savings Plan*	
Course	-.073	.047	.035	.004
Year Level	.112*	.065	.029	.075
Age	.120*	.112*	.090	.118*
Gender	.014	.047	.077	.052
Residence	-.083	.009	-.001	-.028
Allowance	.027	-.046	.034	.006

*Legend: * - correlation is significant at the 0.05 level (2-tailed)*

On the other hand, overall correlation analysis revealed that no significant relation between the profile course (r = .004, p = .05), year level (r = .075, p = .05), gender (r = .052, p = .05), residence (r = -.028, p = .05), and allowance (r = .006, p = .05) and financial literacy of the respondents.

Table 6 shows the correlation data between the respondents' profile and stress. Analysis of the data revealed that the profile course is correlated with the respondents' stress (r = .180, p = .01). The correlation coefficient was positive indicating that more financial-related subject in the curriculum tend to be more stressful to students than the curriculum with lesser number of financial-related subjects. The result of the study is supported by the findings of Beal and Delpachitra (2003) and Shahrabani (2013).

On the other hand, the profile year level (r = .023, p = .05); age (r = .029, p = .05); gender (r = .012, p = .05); residence (r = .058, p = .05); and allowance (r = -.067, p = .05) exist no significant relationship with stress of the respondents.

Table 6. Result of Correlation Analysis between the Profile and the Level of Stress of the Respondents

PROFILE	Level of Stress
Course	.180**
Year Level	.023
Age	.029
Gender	.012
Residence	.058
Allowance	-.067

*Legend: ** - correlation is significant at the 0.01 level (2-tailed)*

3.2. Effects of Financial Literacy on the Respondent's level of Stress:

Table 7 presents the result of correlation analysis between the financial literacy and stress of the respondents. Result of analysis showed that a positive correlation between the financial records (r = .122, p = .05) dimension to the level of stress of the respondents. Correlation analysis implies that a very satisfactory literacy in financial records may lead to a very high stress. Likewise, when financial records literacy is unfortunate, the stress outcomes might be poor.

Furthermore, the financial dimension cash management (r = -.017, p = .05); savings plan (r = .108, p = .05); and overall (r = .080, p = .05) existed no significant impact on the respondents' level of stress.

Table 7. Result of Correlation Analysis between the Financial Literacy and Stress of the Respondents

Financial Literacy	Level of Stress
Cash Management	-.017
Financial Records	.122*
Savings Plan	.108
Overall	.080

*Legend: * - correlation is significant at the 0.05 level (2-tailed)*

4. Predictors of the Respondents' Stress:

Analysis of the data showed that, for every 1 peso decrease in cash management, it leads to .347 point increase in stress. Moreover, for every 1 peso increase in financial records, .285 point increase in stress; and for every 1 peso increase in savings plan, it leads to .175 point increase in stress. Hence, cash management (β = -.231, $p < .004$) is negatively related with stress; and financial records (β = -.285, $p < .038$); and savings plan (β = -.123, $p < .169$) are positively related to stress. The regression coefficient which is negative indicate that as cash management decreases, stress also rises, however, the regression coefficient is positive indicating that as financial records and savings plan increase, stress also rises. The r-square = .040 signifies that about 4% of the variability of stress can be explained by cash management, financial records, and savings plan. The 96% can be explained by other variables. The regression model of this study shows that Stress = 2.404 + (-.347 x Cash Management) + (.285 x Financial Records) + (.175 x Savings Plan).

Table 8. Predictors of Financial Literacy on the Respondents' Level of Stress

Model	Unstandardized *B* Coefficients	Standardized Beta Coefficients	*p*	R^2
1 (Constant)	2.404		.000	.040
Cash Management	-.347	-.231	<.004	
Financial Records	.285	.188	<.038	
Savings Plan	.175	.123	<.169	

CONCLUSIONS

Based from the salient findings, the following were concluded:

1. There is a high financial literacy; and typical stress experienced by the respondents.
2. The BSBA students exhibited higher cash management literacy than the BSOA whereas the BSOA demonstrated better financial records and saving plan literacy than the BSBA.
3. The older the student might be knowledgeable in cash management and financial records; and their over-all financial literacy becomes better.
4. Students enrolled in the BSBA program tend to be more stressful than the BSOA program because of more financial-related subject in its curriculum.
5. Correlation analysis revealed that a very satisfactory literacy in financial record might lead to be more stressful whereas when financial records literacy level is unfortunate might indicate a poor stress outcome. Consequently, the regression model presented as Stress = 2.404 + (-.347 x Cash Management) + (.285 x Financial Records) + (.175 x Savings Plan).

RECOMMENDATIONS

The following were recommended based from the conclusions:

1. A seminar on financial literacy and stress management is being proposed to improve the knowledge and skills in cash management of the students.
2. Faculty members is hereby encouraged to understand the students' perception on the financial literacy dimensions, namely: cash management, financial records and savings plan and strengthen their awareness of the factors favorably affecting their learning situation.
3. It is suggested that the course subject Personal Finance should be recommended as one Elective subject in the BSBA and BSOA curriculum that might address different issues raised by this study.
4. College student should develop a better understanding of the basic concept of financial literacy and its influence on their level of stress.
5. Future researchers are encouraged to conduct similar study by using other variables such as academic achievements, and other courses.

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BRIGADA ESKWELA: LEVEL OF IMPLEMENTATION AND ATTITUDE OF STAKEHOLDERS TOWARDS THE PROGRAM

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ABSTRACT

Brigada Eskwela logically focuses on the physical aspects of the school where improvement of learning process was the main objective. This study assessed the level of implementation and attitude of both internal and external stakeholders. The researcher utilized the descriptive survey design using qualitative and quantitative data with the aid of the questionnaire as the main gathering tool. As such, sixteen (16) school heads, one hundred sixty-seven (167) teachers, three hundred twenty (320) parents and one hundred thirty-five (135) barangay officials were the respondents. Results revealed that during pre-implementation stage, the program should start as early as January every year. The spirit of volunteerism or bayanihan among stakeholders manifested during the implementation stage. Explicit accomplishment report was substantial during the post-implementation stage to value the effort and endeavour of volunteers. However, the positive attitude of stakeholders prevailed as the most important aspect to sustain the activity. The researcher recommended the following: The School Head will lead to discuss the pertinent activities stipulated in the Pre-implementation stage of the Brigada Eskwela manual, together with the teachers they will motivate the parents/volunteers to be more enthusiastic in their involvement of the Brigada Eskwela undertakings through recognizing 10% of the pupils' populace as recipient for scholarship within the school year. The School Head should display a tarpaulin stipulating all the donations and in kind solicited by the teachers for transparency of a concise accounting and should prepare a certificate of recognition to value their efforts and endeavor.

Keywords: Attitude Brigada Eskwela Implementation Stakeholders

INTRODUCTION

Education plays a tremendous role in our society where people live and interact with one another. It is indispensable likewise integral to the growth of a nation. Lumpkin (2013) stressed that positive learning environment where children feel safe and valued at all times is important. This has become the end-goal of Brigada Eskwela program which not only ease the public schools' vulnerability to both natural and human-made disasters to foster a quality and safe education but also enliven the spirit of volunteerism by bringing together teachers, parents and community members every third week of May to work together in preparing public schools for the class opening.

Hence, globally, school readiness is gaining currency as a viable strategy to close the learning gap and improve equity in achieving lifelong learning and full developmental potential among young children. The desires are shifting from school facilities manicuring to upgrade the school plant in a more conducive, safe and motivating child friendly environment, increase performance indicators and promote lifelong learning to the maximum ability using the spirit of Bayanihan.

Furthermore, Brigada Eskwela, also known as National Schools Maintenance Week is the logical extension of the objectives stated in the Republic Act 8525 or the Adopt-A-School Act of 1998. Actual implementation of this project took its debut flight in 2003 pioneering all throughout the public school's system of the archipelago. Anchored on the Brigada Eskwela Manual, (2009) Brigada Eskwela implementation was seen at focusing on the physical aspect where improvement of learning process was the main objective. In consonance, the Department of Education launched the National Schools Maintenance Week (Brigada Eskwela) through Republic Act 8525 in May 2003 and was institutionalized on May 2008 by DepEd Order No. 24, s. 2008.

However, there are clamors coming from the school heads expressing that during the annual Brigada Eskwela, they find tapping the stakeholder's for their participation a very challenging task. The evidence is manifested during the monitoring phase which shows that most of the volunteers are female because accordingly their husbands are off performing their daily livelihood and eventually, the services needed which are supposed to be done with the cooperation of everybody such as masonry, carpentry and painting was being resolved by the teachers from their own expense.

The researcher observed that pooling everything up -tapping stakeholders, sourcing out funds at the same time implementing the planned improvements, is an ardent affliction among teachers. Hence the researcher is prompted to undertake this study to determine the level of implementation and attitude of stakeholders' in the different school-initiated Brigada Eskwela activities. Furthermore, the result of the study would be of great help in the fabrication of a more viable perspective and plan of activities to improve the implementation of Brigada Eskwela.

OBJECTIVES

The study was designed to determine the level of implementation and attitude among stakeholders towards Brigada Eskwela in Ubay I district during the school during the school year 2018-2019.

Specifically, it sought to answer the following questions:

1. What Level of Implementation towards Brigada Eskwela as to:
   1.1 pre – implementation stage;
   1.2 implementation stage; and
   1.3 post- implementation stage?
2. What is the stakeholders' attitude towards Brigada Eskwela?
3. Is there a relationship between the respondents' attitude towards Brigada Eskwela and its level of implementation?
4. Is there a significant difference on the level of implementation as to pre-implementation stage, implementation stage, and post-implementation stage?

RESEARCH METHODOLOGY

This study is focused on the level of implementation and attitude towards Brigada Eskwela among stakeholders of Ubay I District ,Ubay,Bohol. The researcher utilized the modified descriptive survey design to reach out the level of implementation and attitude of stakeholders among Brigada Eskwela. The researcher used the questionnaire as the instrument in gathering data needed in the study in order to generate the information relevant to what is asked in the statement of the problem. The questionnaire was formulated using the local dialect to have a consistent response.

Environment and Respondents. The respondents of the study came from the sixteen 16 public elementary schools of Ubay I District, Ubay, Bohol. They are the school heads, BE coordinators and teachers having the total of one hundred eighty three (183) internal stakeholders and four hundred fifty-five (455) selected external stakeholders from 15 barangays having the total of six hundred thirty-eight (638).

Instruments. To gather all necessary information the researcher used two (2) instruments namely: questionnaire for the level of implementation in the Brigada Eskwela and questionnaire for the attitude of stakeholders in the implementation of Brigada Eskwela. **On questionnaire for the level of implementation in the Brigada Eskwela**. It is composed of two (3) sets of questionnaire namely: Pre-implementation Stage, During-implementation Stage and the Post- implementation Stage using the LIKERT SCALE; 5 – fully implemented (Always), 4 – implemented (Often), 3 – moderately implemented (Sometimes), 2 – slightly implemented (Seldom), 1 – not implemented (Never). **On Attitude of Stakeholders in the implementation of Brigada Eskwela** . It covers the attitude of stakeholders in the implementation of BrigadeaEskwela using the SCALE: 4 -Strongly Agree (SA), 3 – Agree (A), 2 - Disagree (D), 1 -Strongly Disagree (SD).

Data Gathering Procedures. The researcher asked permission from the Schools Division Superintendent of Bohol Division through a letter noted by the Dean of the College of Advanced Studies (CADS) and the Campus Director to conduct this study. Upon approval of the superintendent, the researcher also requested permission from the Schools District Supervisor and school heads. Given the permission from the authority, the researcher distributed the questionnaires to the elementary school heads, BE coordinators and teachers, and the selected stakeholders namely the parents and the barangay officials of 15 barangays of Ubay I District. The researcher was the one personally handed the test questionnaires to the

respondents and give sufficient time to respond in the looked-for data. After the collection, data were treated, analyzed and interpreted for the comprehensive result of the assessment.

Statistical Treatment.

1. To determine the profile of the participants, percentage was used;

Formula:

$$P = \frac{F}{N} X\ 100$$

Where:

P = percentage
F = frequency of response
N = number of case

2. To obtain the weighted mean, the formula below has been used:

$$W.M = \frac{\sum f(wt)}{N}$$

Where:

W.M = weighted mean
F = frequency
Wt = weight
N = number of respondents
∑f(wt) = total of the product multiplied by the weights and frequencies

3. To determine the significant relationship between the respondents' attitude towards Brigada Eskwela and its level of implementation, the Pearson Product Moment Correlation and t-test for correlation coefficient was used. This formula below will be used:

Formula for the correlation coefficient:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n(\Sigma x^2) - (\Sigma x^2)][n(\Sigma y^2) - (\Sigma y^2)}}$$

Formula for the t test for the correlation coefficient:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

Chi-Square. To determine the significant degree of relationship between the different variables, the data were subjected to Chi-Square test using the formula:

$$X^2 = \sum \frac{(O-E)^2}{E}$$

X^2 = correlation coefficient
f_o = observed frequency
f_e = expected frequency

The obtained Chi-square ratio was checked against the table of Significant values at 0.05 level of significance.

4. To obtain the significant difference in the Level of Implementation of the stakeholders' towards the Brigada Eskwela Program in terms of age, highest educational attainment, and type of participant, Kruskal- Wallis Test formula was used as presented below:

$$H = \frac{12}{N(N+1)} \sum \left(\frac{R_i^2}{n_i}\right) - 3(N+1)$$

Where:

H = Computed value
N = total number of observations in all samples combined
R_i = ranks in each group, i= 1, 2, 3,……n
n_i = number of samples in each group

FINDINGS

Table 1 reveals the Demographic Profile of Stakeholder-Respondents.

The profile includes their age, sex, highest educational attainment and type of participant / stakeholder.

As to Age, it shows that majority of the respondents have the age ranging from forty-one to fifty (41-50) years old with the frequency of three hundred eight (308) or 48.28% of the total population. Bearing the least frequency of this study, belonged to age brackets: 30 years having the frequency of 18 or 2.82% , 61 years old and above having 21 or 3.29%.,51-60 years with 132 or 20.69% and 31-40 years, old with the frequency of 159 or 24.92%. This explicates that majority of the respondents are already matured and relatively responsible for work tasked.

Table 1. Demographic Profile of Stakeholder-respondents N = 638

Age	Frequency	Percentage (%)	Rank
Below 30 years old	18	2.82	5
31 – 40 years old	159	24.92	2
41 – 50 years old	308	48.28	1
51 – 60 years old	132	20.69	3
61 years old and above	21	3.29	4
Total	**638**	**100%**	
Sex			
Female	475	74.45	1
Male	163	25.55	2
Total	**638**	**100%**	

Highest Educational Attainment	Frequency	Percentage (%)	Rank
Elementary Level	3	0.47	9
Elementary Graduate	24	3.76	6
High School Level	81	12.70	4
High School Graduate	196	30.72	1
Vocational	5	0.78	7.5
College Level	84	13.17	3
College Graduate	62	9.12	5
Master's Degree Holder	178	27.90	2
Doctorate Degree Holder	5	0.78	7.5
Total	**638**	**100%**	
Type of Participant/ Stakeholder			
Parent/ Guardian	320	50.16	1
Teacher	183	26.68	2
Barangay Official	135	21.16	3
Total	**638**	**100%**	

As to Sex of every respondent, it shows that most of the stakeholders were females with 74.45% of the population equivalent to four hundred seventy - five (475) respondents and only one hundred sixty-three (163) out of six hundred thirty - eight (638) respondents were males with a percentage of 25.55%. It manifests that majority of the volunteers are females.

As to the highest educational attainment of the respondents, this reveals that high school graduate got the highest rank with a total of one hundred ninety -six (196) respondents having a percentage of 30.72% .Among the respondents are master's degree holder with the frequency of 178 or 27.90%.84or13.17%are college level,4th in rank constitutes the high school level with the 81 in number or 12.70%,following are 62 or 9.12% college graduate, elementary graduate respondents garnered 6th in rank were 24 or 3.76%,while doctorate degree holder as well as vocational graduate got the same number consistently with 5 or 0.78.The least in rank are elementary level with the number of 3 or 0.47%. The foregoing findings indicate that the stakeholders who are college graduate are the most number who are participative to school projects and programs.

As to the type of participant/stakeholder-respondents, it can be gleaned that parent/ guardian are the most number of respondents exactly 320 in all or 50.16%.Teachers including the school heads and BE coordinators are 183 or 26.68% while 135 or 21.16 % are the barangay officials that showed sincere responses.

Table 2.1 Schools' Level of Implementation Towards Brigada Eskwela as to Pre-implementation Stage
N_1=183, N_2=320, N_3=135

Statement	Teachers			Parents			Barangay Officials		
Pre-implementation Stage	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**
Every year, the preparation for the successful implementation of the Brigada Eskwela starts as early as January.	4	0	9	4.2	A	10	4.1	O	10
The students, teachers, parents, LGUs, and other stake holders are involved in the planning for the Brigada Eskwela Week.	4	O	9	4.6	A	6	4.6	A	6.5
The School Head acts as the chair of the committee and he himself/ she herself spearheads the planning and organizing of committees.	4.4	A	2.5	4.8	A	2.5	4.9	A	1.5
The School Head orients the members of each committee yearly.	4.4	A	2.5	4.3	A	9	4.4	A	8
The School Head sees to it that the advocacy and marketing committee produce materials like flyers, posters, etc.	4.1	0	7	4.5	A	8	4.6	A	6.5
The School Head assists the resource mobilization committee to list potential partners with corresponding skills/ services & Aresources the school needs.	4	O	9	4.8	A	2.5	4.7	A	4.5
The School Head ensures that the pledges/ commitments of partners are delivered.	4.2	A	5.5	4.8	A	2.5	4.8	A	3
The School Head shares responsibility with the PTA/SGC in administering and managing the funds generated for the program.	4.2	A	5.5	4.8	A	2.5	4.9	A	1.5
All the activities especially the improvements done on the schools are documented through photos and video footages.	4.5	A	1	4.6	A	6	4.7	A	4.5
Different BrigadaEskwela forms are summarized and consolidated for submission.	4.3	A	4	4.6	A	6	4.3	A	9
Average Weighted Mean (AWM)	**4.21**	**Always**		**4.6**	**Always**		**4.6**	**Always**	

Legend:

Rating Scale	Descriptive Interpretation (DI)	Weighted Mean (WM)
4.20 – 5.00	Always (A)	
3.40 – 4.19	Often (O)	
2.60 – 3.39	Sometimes (So)	
1.80 – 2.59	Seldom (Se)	
1.00 – 1.79	Never (N)	

As to Pre-implementation Stage, table 2.1 clarifies the responses of the teachers/school head, parents and barangay officials. On the part of the teachers no9." All the activities especially the improvements done on the schools are documented through photos and video footages got the highest weighted mean of 4.5 (Always). In contrast, item no.1, "Every year, the preparation for the successful implementation of the Brigada Eskwela starts as early as January" got the lowest weighted mean of 4 (Often).

This result is ensuing with the point of study of Abulon et al, (2016) Many parents, whose children are currently enrolled, would be quite passive in their child's education. After enrolling their children they are no longer visible in the school premises even during meetings and gatherings. Seemingly, the burden of child education has become the sole responsibility of the teachers. So the Brigada Eskwela program considered the prerequisite before enrolling their child to the next grade level. In the same manner, during the early enrolment phase that scheduled every 25th of January up to the last Saturday of February of the year, there must be a mutual agreement between the parents and teachers for an early preparation on the implementation of the Brigada Eskwela. Much as, the parents as well as the barangay officials revealed that statements no.3,6,7,8 are at the top of their responses with the weighted mean of 4.8 and 4.9 (Always)." The School Head acts as the chair of the committee and he himself/ she herself spearheads the planning and organizing of committees.","" The School Head assists the resource mobilization committee to list potential partners with corresponding skills/ services & Are sources the school needs",." The School Head ensures that the pledges/commitments of partners are delivered" and "The School Head shares responsibility with the PTA/SGC in administering and managing the funds generated for the program". This relates the study of Priyanka (2016) stated that a great leader is one who is self-aware, understands the importance of communicating with community members and works towards building community, collaborative in nature, is open to new ways, leads by example and also he believes in setting new examples and harness the power of teaching and learning.

Table 2.2 definitely states that items 1,6 and 8 got the same weighted mean of 4.3 (Average) and rank 2 in the teachers/school heads responses." Kick-off ceremony is initiated during the opening of the first day of the BrigadaEskwela Week yearly.","" The School Head directs daily updating of records on donations or resources received during the course of the Brigada week yearly. "and "Accomplishments such as the report of resources generated and its utilization, total number of volunteers and number of hours/days rendered are presented and properly tracked. "However the least in rank of responses is items 2,4,7,8,10 with the weighted mean of 4.1(Often).Thus manifest that majority has the hard time of recognizing the partners and donors and neglects the importance of the closing ceremony of the activities and programs initiated.

Table 2.2 Schools' Level of Implementation Towards Brigada Eskwela as to Implementation Stage N1=183, N2=320, N3=135

Statement	Teachers			Parents			Barangay Officials		
Implementation Stage	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**
Kick-off ceremony is initiated during the opening of the first day of the BrigadaEskwela Week yearly.	4.3	A	2	4.7	A	3.5	4.5	A	4
The School Head appoints team leaders and conducts a briefing on the program of activities.	4.1	O	8	4.1	O	9	4.3	A	9
Donations and commitments received are posted on the transparency board.	4.2	A	4.5	4.4	A	8	4.6	A	4
The spirit of volunteerism or bayanihan among the stakeholders is manifested throughout Brigada Eskwela Week yearly.	4.1	O	8	4	O	10	4.2	A	10
Recording of the daily accomplishments of the volunteers are monitored by the School Head.	4.2	A	4.5	4.5	A	6	4.4	A	8
The School Head directs daily updating of records on donations or resources received during the .course of the Brigada week yearly.	4.3	A	2	4.9	A	1.5	4.8	A	1
Inventory of all materials are conducted regularly.	4.1	O	8	4.5	A	6	4.5	A	6.5
Daily updating of Brigada Eskwela forms are monitored and checked.	4.1	O	8	4.7	A	3.5	4.7	A	2
Accomplishments such as the report of resources generated and its utilization, total number of volunteers and number of hours/days rendered are presented and properly tracked.	4.3	A	2	4.9	A	1.5	4.5	A	6.5
Certificate of recognition to partners and donors are awarded during the closing program.	4.1	O	8	4.5	A	6	4.6	A	4
Average Weighted Mean (AWM)	**4.18**	**Often**	**Often**	**4.52**	**Always**	**Always**	**4.5**	**Always**	**Always**

Legend:

Rating Scale	Descriptive Interpretation (DI)	Weighted Mean (WM)
4.20 – 5.00	Always (A)	
3.40 – 4.19	Often (O)	
2.60 – 3.39	Sometimes (So)	
1.80 – 2.59	Seldom (Se)	
1.00 – 1.79	Never (N)	

On the part of the external stakeholders' response consistently they come up with the same item as to the internal stakeholders that item no.6 is at the top with the weighted mean 4.9 and 4.8 .The least weighted mean is item no.4 that states "The spirit of volunteerism or bayanihan among the stakeholders is manifested throughout Brigada Eskwela Week yearly." This might be the result of less motivation that contradicts the point of view by Kehinde (2017) Volunteering to change other people's life becomes the number one priority to people who value the ideals of togetherness and shared prosperity within the community at large.

Table 2.3 elaborates the Post - implementation Stage of the Brigada Eskwela. Both the internal and external stakeholders got the same result as to the item no.5, weighted 4.60(Always) from the teachers/school heads,4.90(Always) from the parents and 4.80(Always) from the barangay officials as rank 1." Brigada Eskwela documents/ reports for submission are checked."

The least in rank is the item no.7 that states "The School Head disseminates accomplishments to the stakeholders through the school publications and /or through letters." The weighted mean is 3.90 (often) on the part of the teachers/school heads and 4.00 (often) on the point of the parents and barangay officials.

Table 2.3 Schools' Level of Implementation Towards Brigada Eskwela as to Post-Implementation Stage N1=183, N2=320, N3=135

Statement	Teachers			Parents			Barangay Officials		
Post-implementation Stage	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**	**WM**	**DI**	**Rank**
The School Head sends letters of gratitude to partners and donors for their contribution in the conduct of the Brigada Eskwela Week.	4.00	O	9	4.10	A	9	4.30	A	8.5
The School Head convenes all the Brigada Eskwela committee members for the purpose of assessing the level of success of the Brigada Eskwela implementation yearly.	4.50	A	2	4.80	A	2	4.60	A	3.5
The School Head evaluates the school Brigada Eskwela implementation.	4.30	A	5.5	4.50	A	6.5	4.50	A	5.5
The School Head identifies other needs not covered during the Brigada Eskwela Week yearly.	4.20	A	8	4.30	A	8	4.30	A	8.5
Brigada Eskwela documents/reports for submission are checked.	4.60	A	1	4.90	A	1	4.80	A	1
Brigada Eskwela reports are submitted to the division Office on time.	4.30	A	5.5	4.50	A	6.5	4.40	A	7
The School Head disseminates accomplishments to the stakeholders through the school publications and /or through letters.	3.90	O	10	4.00	O	10	4.00	O	10
The School Head invites the parents and other stakeholders to visit the school in celebration of the success of the Brigada Eskwela	4.40	A	3	4.60	A	4.5	4.50	A	5.5
The School Head welcomes the DepED Officials who monitor and evaluate the school implementation of the Brigada Eskwela.	4.30	A	5.5	4.60	A	4.5	4.60	A	3.5
The School Head aligns all BrigadaEskwela& related activities to continuous school improvement in terms of increasing participation rate, reducing drop-out rate, increase student competition and achievement rate.	4.30	A	5.5	4.70	A	3	4.70	A	2
Average Weighted Mean (AWM)	**4.28**	**Always**		**4.50**	**Always**		**4.47**	**Always**	

Legend:

Rating Scale	Descriptive Interpretation (DI)	Weighted Mean (WM)
4.20 – 5.00	Always (A)	
3.40 – 4.19	Often (O)	
2.60 – 3.39	Sometimes (So)	
1.80 – 2.59	Seldom (Se)	
1.00 – 1.79	Never (N)	

Table 3. Respondents' Attitude Towards Brigada Eskwela N = 638

Statement	WM	DI	Rank
Brigada Eskwela……			
is an opportunity to maximize solicitations and donations.	3.00	A	13
helps prepare the school during the opening of classes.	4.00	SA	2
is tedious.	2.50	A	19.5
is an enjoyable event where parents have the opportunity to know more about the school.	3.10	A	10.5
is a prerequisite for enrolment.	2.50	A	19.5
is an opportunity for introducing school education programs.	3.70	SA	6
contributes to the success in implementation of plans and activities of the schools.	3.90	SA	4
offers opportunities to prepare classroom.	4.00	SA	2
helps increase the enrolment.	3.50	SA	7
fosters camaraderie.	3.00	A	13
facilitates bond among the teachers, parents, and barangay officials.	3.20	A	9
motivates parents to participate in the school activities.	3.80	SA	5
makes the school ready for the teachers and students.	4.00	SA	2
engages participation of community stakeholders.	3.10	A	10.5
receives the bayanihan spirit among teachers, parents, and barangay officials.	3.30	SA	8

Statement	WM	DI	Rank
offers a more direct means of intervention through volunteerism and a mechanism for quick, efficient, and effective information dissemination of information to share best practices.	2.60	A	18
stresses the importance of creating a school facility and environment that is built and maintained by the people, of the people, and for the people.	2.90	A	15
helps strengthen the relationship of school to the community where it is housed by the families, barangay, PTA and other institutions.	3.00	A	13
encourages and fosters amongst its student and youth sector the value of civic action and social responsibility gearing toward the leveling-up of quality of basic education system in the country.	2.80	A	16
fosters understanding among all sectors of society that the education of the Filipino people is the responsibility of everyone.	2.70	A	17
Average Weighted Mean (AWM)	**3.23**	**Agree**	

Legend: Rating Scale Descriptive Interpretation (DI) Weighted Mean (WM)
3.25 – 4.00 Strongly Agree (SA)
2.50 – 3.24 Agree (A)
1.75 – 2.49 Disagree (D)
1.00 – 1.74 Strongly Disagree (SD)

Here in table 3, finding illustrates that statement item no. 2 ,"Brigada Eskwela helps prepare the school during the opening of classes." And item no.8, "Brigada Eskwela offers opportunities to prepare classroom " are of rank no.1.These proposition weighted 4.00 (Strongly Agree) among the attitudes.This consistently parallel to the point of view of Macagba III ,(2013) Over the years, the Brigada Eskwela effort has evolved from a week-long cleaning-up.This finding illustrates that statement item no. 2 ,"Brigada Eskwela helps prepare the school during the opening of classes." And item no.8, "Brigada Eskwela offers opportunities to prepare classroom " are of rank no.1.These proposition weighted 4.00 (Strongly Agree) among the attitudes.This consistently parallel to the point of view of Macagba III ,(2013) Over the years, the Brigada Eskwela effort has evolved from a week-long cleaning-up and beautification exercise to a festive coming together of students, teachers, school officials, parents, community members, local government officials, non-government organizations, church groups and the private sector. It has become one of DepEd's major initiatives in enjoining local communities to respond to the needs of public schools and be part of a nationwide effort toward improving Philippine basic education. That different stakeholders should render their support for our schools as there is very limited funding given to them for repair work. As partners in the educational arena, everyone is encouraged to mobilize their own circle of friends to participate in this endeavor and help in preparing public schools for the opening of classes. The least in rank is item no.3 "Brigada Eskwela is tedious" which got the weighted mean of 2.50 (Agree).

Table 4. Relationship Between the Respondents' Attitude Towards Brigada Eskwela And its Level of Implementation N1=183, N2=320, N3=135

Attitude Towards Brigada Eskwela and …..	r	p-value at α=0.05	Interpretation	Decision
Level of Brigada Eskwela Implementation	-0.134	0.001	Significant	Reject Ho

Table 4 shows the relationship between the respondents' attitude towards Brigada Eskwela and level of Brigada Eskwela Implementation. Results revealed that there is significant relationship between the respondents' attitude towards Brigada Eskwela and level of Brigada Eskwela implementation since the computed correlation coefficient value of -0.134 with the p-value of 0.001 which is lesser than 0.05 level, thus reject the null hypothesis. This implies that the success of the implementation of Brigada Eskwela depends on the positive attitude of the stakeholders.

Table 5. Difference Between the Respondents' Perception on the Level of Brigada Eskwela Implementation N1=183, N2=320, N3=135

Brigada Eskwela Implementation	F	p-value at α=0.05	Interpretation	Decision
Pre-Implementation Stage	35.489	<0.001	Significant	Reject Ho
Implementation Stage	9.195	<0.001	Significant	Reject Ho
Post Implementation Stage	3.688	<0.026	Significant	Reject Ho

Table 5 divulges the test of difference between the respondents perception on the level of Brigada Eskwela implementation. The result disclosed that there is significant difference between the respondents' perception on the level of Brigada Eskwela implementation as to Pre-implementation, Implementation and Post-implementation since the computed F value of 35.489 and 9.195 and 3.684, with the p-value of <0.001 which is lesser than 0.05 level of significance. Thus the null hypothesis is rejected. There is also significant difference between the respondents' perception on the level of Brigada Eskwela implementation since the computed F value for the Post Implementation is 3.688 with the p-value of <0.001,<0.001,and <0.026 respectively are

lower than the present level of significance 0.05,thus, the null hypothesis is rejected. The result denotes that the level of implementation among stakeholders differ in such a way that they are aware on the planning and reluctant in the implementation activities.

Multiple Comparisons using Tukey Test

Variable	Group	Group	Mean Difference	Sig.	Interpretation
Pre-Implementation	1	2	-.3495*	.000	Significant
		3	-.4023*	.000	Significant
	2	1	.3495*	.000	Significant
		3	-.0528	.558	Not Significant
	3	1	.4023*	.000	Significant
		2	.0528	.558	Not Significant
During Implementation	1	2	-.35836*	.000	Significant
		3	-.33919*	.004	Significant
	2	1	.35836*	.000	Significant
		3	.01917	.978	Not Significant
	3	1	.33919*	.004	Significant
		2	-.01917	.978	Not Significant
Post Implementation	1	2	-.1038	.056	Not Significant
		3	-.1341*	.041	Significant
	2	1	.1038	.056	Not Significant
		3	-.0303	.817	Not Significant
	3	1	.1341*	.041	Significant
		2	.0303	.817	Not Significant

CONCLUSIONS

In light of the findings Brigada Eskwela in Ubay I district is implemented. Yet it requires better correspondence among stakeholders as early as January to begin a workable plan. The spirit of volunteerism or bayanihan should be motivated well for a productive outcome during the implementation stage. Meanwhile, post implementation stage accomplishment report needs a transparency to gain trust among stakeholders. Certificates of recognition must be the highlight during the closing program to value their efforts and endeavor. Positive attitudes among the stakeholders is vital to the success of the program.

RECOMMENDATIONS

Based on the conclusions mentioned, the researcher recommends the following:

1. Develop a workable Brigada Eskwela plan as stipulated in the Pre-implementation stage of the Brigada Eskwela manual.
2. Increase level of participation in Brigada Eskwela through intensive advocacy plan, scholarship, giving of recognition, incentives and awards.
3. The school should be transparent to all financial accountability achievements, performance to the stakeholders to gain continuous support from them.
4. The School Head will encourage the stakeholders 100% involvement and participation through giving a systematized tasking of volunteers that depends upon their skills like masonry, carpentry, painting, clean-up and gardening.

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PEER-ASSISTED DYNAMIC LEARNING PROGRAM AND ITS INFLUENCE ON STUDENTS' PERFORMANCE IN SCIENCE

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ABSTRACT

Educators and researchers have long been interested in exploring methods contributing effectively to the quality of students' performance in Science. This experimental research study aimed to determine the effect of Peer-assisted Dynamic Learning Program on student's performance in Science. It was a non-randomized control design in which experimental and control groups were selected without randomization. The researcher-made questionnaire was used as pretest and posttest. In doing this experimental study, the researcher hoped to gain ideas and understanding of how was the pairing of high performing students with the low performing students affect students' performance in Science. The researcher-made questionnaire was used as pretest and posttest which was also subjected to reliability and validity tests. A sample was drawn from the Grade VIII students of Anda High School, Anda, Bohol. Results revealed that there is a significant difference between the students' pretest and posttest performance in Science in both the control and experimental group. Furthermore, the mean difference between the posttest performance of both groups revealed that the students exposed to Peer-assisted Dynamic Learning Program or the experimental group got a higher score in Science compared to the students belonged to the control group. The result further disclosed that Peer-assisted Dynamic Learning Program bridges the gap between students' interest and difficulties in Science. This denotes that Peer-assisted Dynamic Learning Program has a positive effect on students' academic performance in Science. The researcher concluded further that Peer-assisted Dynamic Learning Program is an effective strategy in teaching Science.

Keywords: Dynamic, Influence, Learning, Peer, Performance

INTRODUCTION

Education is very essential and considered to be the necessity of every human endeavor. It guarantees the acquisition of knowledge and skills that enable individuals to improve their quality of life. The quality education for the learners remain the top priority of the science teachers. Education offers students in science the ability to access a wealth of knowledge and information which will contribute to an overall understanding of how and why things work like they do. Many students find science subjects inspiring and interesting.

However, poor performance in science subjects increases from time to time among secondary school students in Tanzania, East Africa and the globe at large in recent years (Majo, 2016). Trends in Mathematics and Science Study (TIMSS) results showed that the Philippines performed least among ten (10) participating countries in mathematics and science overall and as well as in specific content areas and cognitive domains in terms of average scale score and percent correct responses. Comparing the scale scores of the students with the benchmark levels, only 1% of the Filipino students reached the advanced level (Ogena, Laña, & Sasota, 2010).

Despite significant achievements in improving access to quality education over the past years, poor performance in science subjects at the primary and secondary school level raises concerns over whether or not the education system can supply graduates who possess the competencies required of them within the emerging education sector. Stakeholders have called on the government to see the need to arrest the rising incidence of students' disappointments to take immediate action that would make the nation run dan-

gerously short of scientists (Shekighenda, 2010). Hence, teachers should use alternative teaching strategies which will help students fully appreciate areas in science.

Moreover, Arendale (2014) stressed that peer-assisted learning contributes a positive outcomes and improved academic performance of the students and the Dynamic Learning Program (DLP) puts premium on the design and control of the total school learning environment, with all elements in a coherent framework purposefully designed to induce sustained learning, even in situations where there is a lack of mature and competent teachers. DLP adopts the perspective of progressively knowing "what students learn and how they learn" over "what to teach and how to teach". The researcher, therefore, believes that there is a need to use Peer-Assisted Dynamic Learning Program to improve students' performance in science.

THE PROBLEM

The study was to evaluate the Peer-assisted Dynamic Learning Program and its effect on the performance of the Grade VIII students in Science during the third quarter, School Year 2018-2019. Specifically, it seeks to answer the following questions:

1. What is the pretest performance of the students belonged to the control group and those belong to the experimental group?
2. What is the posttest performance of the students belonged to the control group and those belong to the experimental group?
3. Is there a significant difference between the pretest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?
4. Is there a significant difference between the pretest and posttest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?
5. Is there a significant difference between the posttest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?

Hypotheses

1. There is no significant difference between the pretest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?
2. There is no significant difference between the pretest and posttest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?
3. Is there a significant difference between the posttest performance of the students exposed to DLP and those exposed to Peer-assisted DLP?

METHODOLOGY

To evaluate the effectiveness of Peer-assisted DLP on students' academic performance in Science, the participants were divided into two, the control and the experimental group. Non-randomized control design was used in which experimental and control groups were selected. The researcher utilized the same topics in Science as stipulated in the curriculum guide. The design contains the pretest, the experimentation, and the posttest.

The study was conducted at Anda High School, Katipunan, Anda, Bohol. The respondents were forty-eight (48) grade eight students. The twenty-four (24) Grade VIII Charity students were the control while the twenty-four (24) Grade VIII Courtesy students were the experimental group taking Science during the school year 2018-2019. The test made by the researcher was used as a pretest and posttest of the study. It was based on the K to 12 Basic Education curriculum. The researcher used the third quarter topics – Matter, Particles of matter (properties and arrangement of the states of matter: solid, liquid, gas). Before the construction of the 60-item test in Science specific variables to be measured were clearly defined and a table of specification was formulated. Sixty (60) items were prepared to measure three skills, namely: Knowledge (60%), Comprehension (30%), and Higher Order Thinking Skills (10%).

The researcher-made test was subjected to content validation by the Science teachers and the School Head who is also a science teacher. Thereafter, the pilot testing was conducted to the Grade 9 students and the result was duly analyzed. An item analysis was conducted to validate the questionnaire. Difficulty and discrimination indices were determined which serve as the basis for acceptance or rejection per item. The reliability coefficient obtained was 0.771 thus, the test was highly reliable.

The researcher asked permission from the Schools Division Superintendent, Department of Education, Division of Bohol, to conduct a study

on Per-assisted Dynamic Learning Program and Students' Academic Performance in Science during the third quarter of the academic year 2018-2019. Given the approval, the researcher drafted a 60-item test covering the third quarter lessons in Science. The researcher-made test questions were validated and pilot tested, with the consequent final 48-item test administered to the respondents. Pretest was administered to the control group and the experimental group. The third quarter topics in Science were given to the control group using the Dynamic Learning Program, and the same topics were also offered to the experimental group using the Peer-assisted Dynamic Learning Program. After the third quarter topics have been presented to both groups, the posttest was administered.

REVIEW OF RELATED LITERATURE

The Universal design for learning is a teaching and learning approach that helps to ensure that high-quality literacy and learning experiences are multi-dimensional, multi-sensory, satisfying, meaningful, and exciting for every child. These principles help the needs of students in the classroom. In our country, there's a lot of innovations especially in Science and Technology to achieved quality education (Meyer, Rose, & Gordon 2014).

Likewise, the Peer Assisted Learning Strategy (PALS) is a class-wide peer-tutoring program that addresses the different learning needs of every student. This cooperative learning technique pairs students together and gives them the roles of a "Coach" and a "Player". Research supports that the use of pairs in the classroom provides more focus on individual student needs rather than a teacher-directed activity that may address the needs of students (Hughes & Macy, 2008). It has the potential to benefit new students' transition into Higher Education and enrich their learning, by involving students who have relatively recently gone through the transition process themselves. It can aid both subject understanding and act as a platform for developing students' academic literacies and skills. (Ulanicka, 2018).

Studies have shown that PALS and peer tutoring programs have a positive correlation with examination performance and have led to a reduction of stress and enhancement of course satisfaction among students. This study is consistent with the results of major studies conducted on peer-assisted learning: there was improved academic achievement. It also gains in intellectual and social awareness and empathy and that peer tutoring in schools appears to have a positive effect on learning (Chan, 2016).

According to Watson (2015) effects of PALS may also be more likely to be seen with peer measures instead of teacher measures. However, further research is needed and future studies should seek to expand on these practical implications to determine the most effective way to extract the benefits of the PALS program for ELL students. PALS is an effective way to increase the reading fluency of all students, including English Language Learner (ELL) students. This is likely because it involves research-based strategies that promote academic achievement such as enhanced exposure to reading, increased comprehensible input (in such a way that the students understand it), immediate corrective feedback. Having the most effective educational experience is critical for students; because one thing that all ELL students tend to have in common is lower academic achievement than their non-ELL peers, However, other researchers have found that ELL students are able to catch up with their peers and maintain their academic success with the help of early intervention.

Professional Learning Exchange Advisory stated that the U.S. Department of Education has identified the following characteristics as necessary for the successful use of pairs. One important aspect they provide is the following list of key actions research has proven to be necessary components of an effective peer learning program. Using partner work school-wide is efficient. Once students learn the routines of pair work, they can quickly engage in practice opportunities in a wide variety of subjects. Using similar peer routines throughout the day allows teachers to augment the number of practice opportunities for all students (Hughes & Macy, 2008)

The What Works Clearinghouse review of Adolescent Literacy states that pairing of students to work together on reading activities provide opportunities to improve reading accuracy, fluency, and comprehension. This addresses student positive outcomes in four domains: alphabetic, reading fluency, comprehension, and general literacy achievement (Murray 2012).

The effects of PALS on students across different student groups with cultural, ethnic considerations, language disabilities, learning disabilities, and other considerations were all positive with significant statistical growth on varied test measure. The three important points in regards to the use of the PALS Program is to implement with

high fidelity, it will be more beneficial when used with a beginning reading program and used as a supplement (Patterson 2013). Through the help of group or peer students have cooperation.

Based on findings, PAL is portrayed (when it works) as an open, informal, cooperative environment, in which students are able to set the agenda and raise their concerns, which is overseen by a trusted and approachable individual, and is of value in adjusting to university, understanding course material, enhancing the ability to do well in assessed work and building confidence." These values are ones which can then resonate to benefit student and institution alike (Capstick, 2004; Green, 2011). Various findings and evaluation supported that peer-assisted learning gives benefit especially to the low- performing students.

According to Yang (2017) the evaluation of peer-assisted learning in a developing country setting, peer tutoring program that paired high-performing and low-performing students and incentivized them to study together and improve as a group. They are benefited from multiple dimensions, including higher standardized Math and Science scores, lower social stress, lower dropout rate, more favorable attitudes towards school, less absence, and less misbehavior. So lots of programs or methods of instruction used just to improve academic performance.

Dynamic Learning Program (DLP) is a program centered on activity-based multi-domain learning that requires students to work independently, to discover and understand the lesson on their own by reading the concept notes and by doing the exercises before the lesson is discussed and explained. The "Learning by doing" in the Dynamic Learning Program in public schools of the Division of Bohol by the Bernidos is the method of instruction used. The idea is that; students learn more by doing rather than by merely listening. The students are not given an assignment for them to work at home giving them ample time to rest and to spend time with their family members, especially on a weekend. All activities are done in school, facilitated and supervised by the teacher making sure that all activities are done by the students themselves. Parents, on the other hand, are very much guided on every detail of the activities through the portfolios of the students. (RANCES, 2010).

According to Bernido (2004), The CVIF Dynamic Learning Program (DLP) was initially developed and applied in the high school in the Philippines. It presents the essential features of the CVIF-DLP as a differentiated and target-oriented program for effective learning under multiple socioeconomic and cultural constraints. It was designed based on our experiences as physicists immersed in daily work in a secondary school, the first author being Principal and science/math teacher, and the second author being Research Director, respectively. The major components of the program are (1) Parallel Classes, (2) Activity-based Multi-Domain Learning, (3) In-school Comprehensive Student Portfolios (instead of notebooks), and (4) Strategic Study/Rest Periods. The parallel classes scheme has all sections of each year level having the same subject at the same time. The total number of minutes for each subject conforms to the national basic education curriculum prescribed by the country's Department of Education.

Activity-Based Learning where students work on the activity for most of the class period without a prior lecture, discussion, or demonstration from the expert teacher. This is why, by the time the expert teacher visits the class, students already have particular questions or problems in mind. They are then able to give directed questions that have direct bearing on the problems they tried to solve earlier. The expert teacher simply reinforces correct understanding, points out common errors, or compares the merits of different approaches and solutions.

The Comprehensive Student Portfolio includes quizzes and exams, are compiled in the in-school. The reflective teacher and administrator can thus make use of the comprehensive portfolio as a highly effective evaluative tool for continuing enhancement of learning processes. On the other hand, students manifest reflective and self-evaluative behavior when filing and organizing activities in their portfolios.

Lastly, is the Strategic Study/Rest Period. Monday, Tuesday, Thursday and Friday – are for academic work, while Wednesday is for Music, Arts, Physical Education and Health (MAPEH). There are no classes on Wednesday afternoons. Remedial work, faculty and club meetings, training and rehearsals are also done on Wednesdays. Close adherence to this schedule has developed in students a strong sense of time management for their different activities (Bernido, 2004).

According to the study entitled " The Effects of Dynamic Learning Program on the Performance of the Students and Teachers of Colegio de San Bartolome de Novaliches". The DLP works with the students, with more learning and focuses more on academic studies. The effect of the DLP is a big part of the learning of a student. Based on

the survey about 88% of the respondents can cope up and are in good condition in this new learning program. (Polintan 2013; Abegonia 2016)

The Dynamic Learning Program helps the students show their skills and become a person who will create a good result in the students in terms of writing, listening and to become a fast worker and to finish the study or the lesson as early as they can. The achievement of students through DLP help them improve their academic grades. This is showed on the test results on different schools in our country.

According to Elevera, (2013) College of Quezon City Test results showed that the average percentage score of the first batch that studied under the CVIF-DLP rose one percentage point compared to that of the previous batch under the traditional teaching framework. The school also tapped a third party, the Asian Psychological Services and Assessment Corp., to conduct a standards-based test in English, Mathematics and Science and results showed that of the 144 Grade 6 students, 92 showed proficiency in English; 58 in Math; and 53 in Science. It was noted that for both Science and Math, which are considered difficult subjects, the number of students that are progressing towards the standards are 82 and 70, respectively, which means that majority of the class are catching up with the students that have been getting high grades before the implementation of CVIF-DLP. Moreover, the recent study gives a comparison of the pre-CVIF-DLP and post-tests for English, Science and Math also showed that the average scores went up by 3 points for English, 4 points for Science, and 8 points for Math. The number of scholastic awardees also went up. In 2011-2012, out of the total 135 graduating students, only 7 garnered a general average of 90 percent and above and didn't have any grade lower than 85 percent in all subjects. For the 2012-2013 school year when CVIF-DLP was implemented, 31 of the 144 graduating students received scholastic awards for garnering a general average of 90 percent and above and without any grade lower than 85 percent in all subjects. This result provides an idea that DLP implementation was effective for students.

According to Basilio (2008), DLP reveals that there is a significant in the posttest scores between students with no exposure and those who were exposed to DLP for one year. The posttest score is higher for students who were exposed to DLP than those with no exposure. This implies that the program was already effective during the first year of implementation. The focus in DLP is letting the student do, think and learn with the interaction of individuals in the classroom environment.

Piaget (1967) Constructivism Individuals construct their knowledge during interaction with the environment. Thinking is an active process whereby people organize their perceptions of the world. The environment does not shape the individual. Constructivism is a theory of knowledge (epistemology) that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. During infancy, it is an interaction between their experiences and their reflexes or behavior-patterns. Piaget called these systems of knowledge schemata. The term refers to the idea that learners construct knowledge for themselves---each learner individually (and socially) constructs meaning---as he or she learns. Constructing meaning is learning; there is no other kind. The dramatic consequences of this view are twofold; we have to focus on the learner in thinking about learning (not on the subject/lesson to be taught): There is no knowledge independent of the meaning attributed to experience (constructed) by the learner, or community of learners.

Mwamwenda, 2009; Lefa, 2014. It is possible to incorporate Piaget`s theory in the classroom, especially to the learners. Piaget takes a constructivist point of view and believes that learners are not passive in their knowledge. Piaget's theory suggests that students need a curriculum that supports their cognitive development by learning concepts and logical steps. He also suggests that children are only capable of learning specific material in specific stages of cognitive development. Piaget emphasizes that learning takes place as a result of the active engagement of learners is important, so teachers have to see the learners take an active role by participating in whatever is being taught and learned. Piaget's theory acknowledges individual differences in cognitive development. Teacher should arrange activities that learner's intellectual development. Piaget shows that a child`s understanding is restricted by stages that he or she has reached and teachers should take this into account as they teach children with different levels of intellectual development.

According to Rizk (2011), John Dewey's theories and beliefs in action in 21st-century classrooms are certainly becoming more and more infrequent, however, it is possible, as shown by the various teaching models presented. In some schools and classrooms throughout the United States and other countries around the world, John

Dewey's theories are still quite present. These schools and classrooms are still emphasizing the importance and relevance of building community, building strong relationships, developing higher-level thinking skills for real-life application, and following student interests when planning for instruction. Students who are participating in academic programs will likely be critical thinkers and significant, positive contributors to their local communities and to society as they mature into adult citizens. Principles of Piaget's theory of cognitive development and its implications for peer learning. Special attention is focused on how peer learning relates to Piaget's model of constructivism thorough review of empirical work on the role of peer interactions in children's understanding of social justice and fairness, and children's logical thinking and spatial reasoning. The literature provides evidence that peer interactions can enhance learning outcomes in tasks within a developmental framework. Peer interactions also support cognitive change through dialogue and discussion more effectively than independent, individual work. Dewey believed that the meaning of a given experience is the result of the interaction between what the learner brings to the given situation and what happens there. For Dewey, continuity and interaction are the two fundamental criteria for determining the quality of experience and its implications for education. Thus, it is necessary to adopt different teaching and learning approaches for quality learners.

Section 10, Article XIV of the 1987 Philippine Constitution, states that Science and technology are essential for national development and progress. The State shall give priority to research and development, invention, innovation, and their utilization; and to science and technology education, training, and services. It shall support indigenous, appropriate, and self-reliant scientific and technological capabilities and their application to the country's productive systems and national life. The state prioritizes such development and innovations especially in education to provide a productive learner in the future. Thus, teaching strategy and innovations are essential in teaching science and must be implemented effectively for the realization of the national agenda.

Moreover, Educational Act of 1982 Section 2 states that “one of the rights of the students in school is the right to receive primarily through competent instruction, relevant quality education in line with the national goals conducive to their full development as persons with human dignity”. These can be realized through competent and dedicated teachers.

Likewise, Republic Act No. 7836 Article IV Sec.2 stressed that "every teacher shall uphold the highest possible standard of quality education and shall make the best preparations for the career of teaching shall be at his best at all times and in the practice of his profession".

Learners learn most from experiences with the help of the teachers in improving and facilitating knowledge. However, there are instances that they learn through the cooperation of peers. Thus peer-assisted DLP is integral for the learning process.

FINDINGS

Table 1. Pretest Performance of the student-respondents in Science

Score	Description	Control Group			Experimental Group		
		F	%	Rank	F	%	Rank
39 - 48	Excellent	0	0.00	4	0	0.00	4
29 - 38	Very Satisfactory	0	0.00	4	0	0.00	4
19 - 28	Satisfactory	3	12.50	2	3	12.50	2
9 - 18	Fair	21	87.50	1	20	83.33	1
0 - 8	Poor	0	0.00	4	1	4.17	4
Total		**24**	**100%**		**24**	**100%**	
Mean		**14.417**			**14.583**		

Table 1 shows the pretest performance of Grade VIII students in Science. The result revealed that the majority of the students of both groups got a score of at most 18 which is described as a “Fair”. It indicates that the two groups have almost the same pretest performance. The student-respondents’ performance during the pretest implies that both groups have a reasonable foundation in Science. This denotes further that the student-respondents have almost the same level competence in Science.

Table 2. Posttest Science Performance of the student-respondents in Science

Score	Description	Control Group			Experimental Group		
		F	%	Rank	F	%	Rank
39 - 48	Excellent	1	4.17	4	3	12.50	3
29 - 38	Very Satisfactory	4	16.67	3	8	33.33	2
19 - 28	Satisfactory	12	50.00	1	11	45.83	1
9 - 18	Fair	7	29.17	2	2	8.33	4
0 - 8	Poor	0	0.00	5	0	0.00	5
Total		**24**	**100%**		**24**	**100%**	
Mean		**21.375**			**25.792**		

Table 2 displays the posttest performance of Grade VIII students in Science. It is reflected in the table that majority of the student-respondents in both groups got a score of "19-28" which is described as "Satisfactory". Furthermore, there were 5 or almost 21% of the students belonged to the control group and 11 or more than 45% of the students belonged to the experimental group got a score of at least 29 which is described as at least "Very Satisfactory". This indicates that both groups of students exposed to DLP and those exposed to Peer-assisted DLP have at least satisfactory posttest performance in Science.

This is supported by the study of Yang (2017) which stressed that peer-assisted learning in a developing country setting, peer tutoring program that paired high-performing and low-performing students and incentivized them to study together and improve as a group. They are benefited from multiple dimensions, including higher standardized Science score.

Table 3. Test of difference between the Pretest Performance of the Control Group and Experimental Group

	Mean Scores		t	Sig. (2-tailed)	Finding
	Control Group	Experimental Group			
Pretest	14.417	14.583	- 0.136	0.892	Not Significant

Table 3 illustrates the test of difference between the pretest performance of the students exposed to DLP and those students exposed to Peer-assisted DLP. The result revealed that there is no significant difference between the pretest performance of the control group and experimental group since the computed t-value of -0.136 with the p-value of 0.892 which is greater than 0.05 level of significance thus, the null hypothesis is accepted. This denotes that the pretest performance in Science of both groups were statistically equal. It further implies that the students of the two groups have equal ability in Science before the experiment period.

According to Piaget (1967), "individuals construct their knowledge during interaction with the environment". Learners are not passive in their knowledge and learning takes place as a result of the active engagement of learners.

Table 4. Test of difference Between the Pretest and Post-test Performances of the student-respondents

Group	Mean Scores		Mean Difference	t	Sig. (2-tailed)	Finding
	Pre test	Post test				
Control	14.42	21.38	6.96	- 5.93	<0.001	Significant
Experimental	14.58	25.79	11.16	-7.43	<0.001	Significant

Table 4 discloses the test of difference between the pretest and posttest performance of the students exposed to DLP and those exposed to the Peer-assisted DLP. The result revealed that there is a significant difference between the pretest and posttest performance of the control group since the computed t-value of -5.93 with the p-value of <0.001 which is lesser than 0.05 level of significance thus, the null hypothesis is rejected. This simply means that learning happens when Dynamic Learning Program is employed in teaching Science.

Moreover, there is a significant difference between the pretest and posttest performance of the students exposed to Peer-assisted DLP since the computed t-value of -7.43 with a p-value of <0.001 which is less than 0.05 level of significance hence null hypothesis is rejected. The significant difference implies that peer-assisted instruction provides students an opportunity to learn better in Science.

The result is parallel to the study of (Chan, 2016) that peer-assisted students have a positive correlation with examination performance and satisfaction among students. There was improved academic achievement and also that peer tutoring appears to have a positive effect on learning.

Table 5. Test of difference Between the Posttest Performance of the Control and Experimental Group

	Mean Scores		Mean Difference	t	Sig. (2-tailed)	Finding
	Control Group	Experimental Group				
Posttest	21.38	25.79	4.42	-1.943	0.058	Not Significant

Table 5 exposes the test of the difference between the posttest performance of the students belonged to the control group and experimental group. The result disclosed that there is no significant difference between the posttest performance of students of both groups of student-respondents after the experimental period since the computed t -value of -1.943 with a p-value of 0.058 which is

greater than 0.05 level of significance hence, the null hypothesis is accepted. The result denotes that statistically, both groups have the same post-test performance. Moreover, the mean difference of -4.42 simply means that the posttest scores of student-respondents exposed to Peer-assisted DLP in Science is greater than the posttest scores of the student-respondents exposed to DLP. This further implies that students exposed to Peer-assisted DLP learn better compared to those students exposed to DLP. This is in line with the study of Arendale (2014) that peer-assisted learning contributes a positive and improved academic performance of students. Place Winner

CONCLUSIONS

Based on the above findings, Peer-assisted Dynamic Learning Program improved students' performance in Science compared to those students exposed to Dynamic Learning Program. It can be inferred that peer-assisted instruction is helpful to students in learning Science. It provides opportunity especially to the low performing students to learn and understand science concepts and fosters positive benefits in learning Science concepts which enable them to gain knowledge through the help of their peers. Thus, students recognized Peer-assisted Dynamic Learning Program as an effective approach in learning Science.

RECOMMENDATIONS

Based on findings and conclusions, the researcher came up with recommendations for the enhancement in teaching Science.

1. School administrators should provide teachers with training opportunities, support, encouragement, and recognition in implementing Peer-assisted Dynamic Learning Program in teaching Science.
2. Science teachers need to use the Peer-assisted Dynamic Learning Program as an effective teaching approach in teaching Science.
3. This study may serve as a basis and guide in conducting research-related endeavors. For further improvements, researchers may conduct studies on the effect of peers in teaching Science into another area such as Biology, Earth Science, and Physics.

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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 Al2O3 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:

Measure the pH value of the nano-fluids at different volume ratios.

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 (ZrO2 and Al2O3) 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 Al2O3 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.

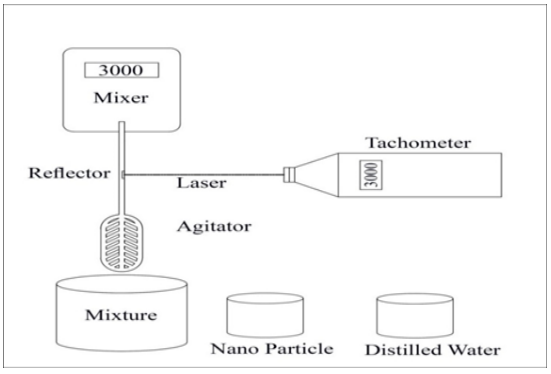

Figure 2.1: Experimental Setup for Mixing of Aluminum /Copper Oxide Nanoparticles and Distilled Water

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 mixing 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:

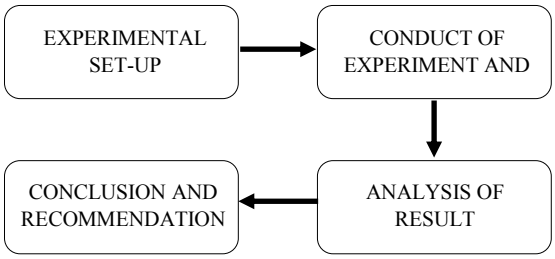

Figure 1: Flow Chart showing the steps in the conduct of the Study

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: Copper Oxide

Figure 3: Aluminum Oxide

Figure 4: Distilled Water

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

Table 1: Weight Fraction of Copper and Aluminum Oxide Nanofluids

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 nanofluid.

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.

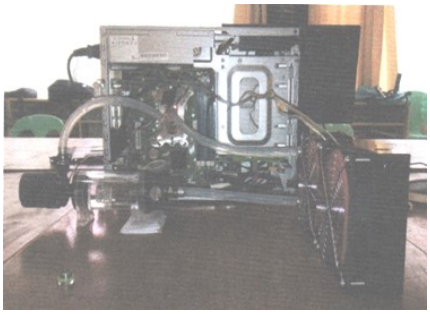

Figure 7: Set-up of the Cooling System for CPU

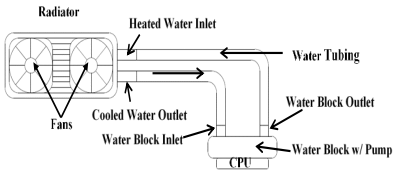

Figure 8: The schematic diagram of the cooling system used

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			
	Trial			Average pH Level
	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			
	Trial			Average pH Level
	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^2)	Change in Temp. (°C)	Convective Heat Transfer Coefficient (kJ/m^2K)
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^2)	Change in Temp. (°C)	Convective Heat Transfer Coefficient (kJ/m^2K)
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 ($m^{2)}$	Change In Temperature (°C)	Heat Absorbed (kJ)	Convective heat transfer coefficient (kJ/m^2K)
Distilled Water	0.0025	9.6	879.261 961	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/ m2K.

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.

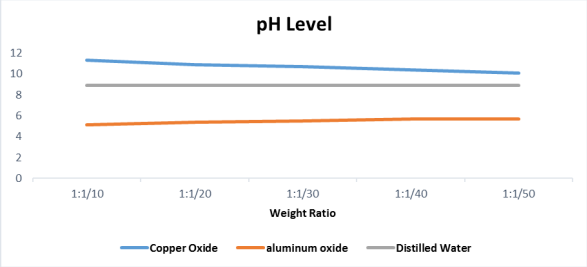

Figure 9: Graph of the pH Levels of the nanofluids and distilled water

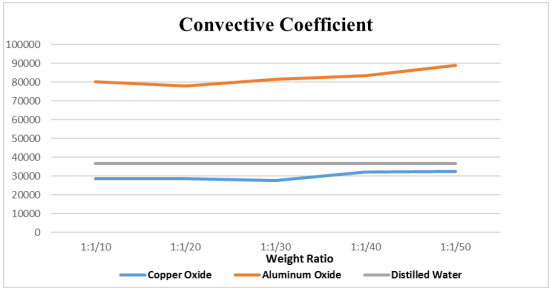

Figure 10: Graph for Convective Heat Transfer Coefficients

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 Al2O3 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.

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