LA SALLE UNIVERSITY

LASALLIAN RESEARCH FORUM

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Foreword

Lasallian Research Forum Vol. 12 No. 4 is a collection of various articles featuring the works of our teachers from the different disciplines.

The article on Brachistochrone Problem was made to help to the quest of minimum time of traversal in real physical situation incorporating the concept of kinetic friction. The article on Labo River demonstrates our great concern for nature while the article on Subanen shows that we feel and care for our fellowmen. The article on chorizo and hotdog aids society to be vigilant on choosing preserved foods. Further, the article on grade six performance using a standardized test from the Center of Educational Measurement gives anyone an idea that typical data from the guidance office can be of help in designing an enrichment program to improve students' learning. Lastly, the article on the assessment on the procedural skills of health care students confirms our passion for teaching and of meeting the needs of our students.

The editorial board desires to carry on the La Salle University's mission by providing you more on our next journal. Lastly, we would like to extend our gratitude to writers of this issue for their untiring support that makes the success of this publication possible.

Dr. REZYL R. MALLORCA
Institutional Research Director

The "Brachistochrone" Problem with Friction and a Computational Verification

Merven M. Pailden
Science Department

Abstract

This paper explores an extension of the famous brachistochrone problem finding the path of minimum time of traversal in a gravitational field. A computational method of finding the time of the traversal of the said path was introduced and a comparison to the time of the inclined path was explored. Some numerical methods were used in the study and were implemented using a graphical user interface for the simulation of the paths.

1. Introduction

Three hundred ten years had passed after the Bernoulli brothers sought for the solution for the path of the shortest time of traversal of a point mass particle in a frictionless gravitational field (known as the *brachistochrone problem*). From that time on , Jakob and Johann Bernoulli, Newton, Leibniz, and L'Hospital are among the biggest names that have been linked to the solution of this problem. They found that this apparent curve (path) is of the form of a *cycloid* [1]. Since then, the experimental verification of this result lured new generation physicists and engineers. Nowadays, modern verification on this concept includes some computational factors using the aid of computers (see Pailden [1]).

Today, numerical accounts of this historic problem and its solutions are posted in the World Wide Web (www) and in the internet. Majority limit themselves to the frictionless traversals and a few deal with the extensions such as brachistochrone with friction (Haws, 1995 [2] as presented by Weisstein, 1999 [3] ; Parnovsky, 1998 [4]) , Brachistochrone with Drag and Giant Brachistochrone (Parnovsky [4]), Brachistochrone in a Spherical Mass Distribution (Mitchell, 2006 [5]), Relativistic Brachistochrone (Gemmer, 2006 [6]), Quantum

Brachistochrone Problem (Mostafazadeh, 2007 [7]), and even the Generalized Brachistochrone (Parnovsky, Gemmer).

Objective of the Study

In this paper, the focus was on a specific extension of this problem that was presented by Haws and extended it further to its computational verification and comparison to an inclined path with friction along with a simulation program in the comparison.

Theory: Haws, 1995 [2]
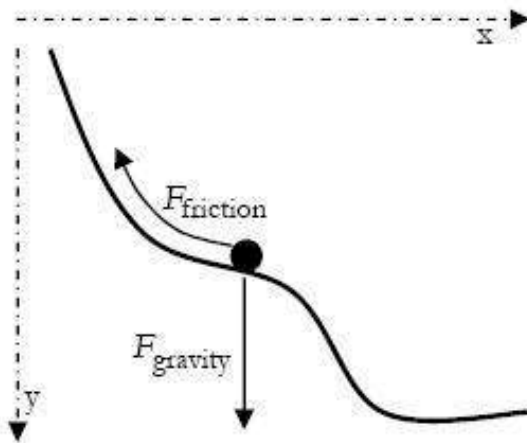
Figure 1

As presented by Weisstein, Haws argued that, including the kinetic friction in the problem, the normal components of the weight and of the acceleration contribute to the complete description. But this approach would yield a "significantly messier" solution (Weisstein [3]) thus; he considered only the normal component of the weight. Hence, the components of the solution (curve) in Figure 1 are

$F_{gravity} = mg\frac{dy}{ds}$ and $F_{friction} = -\mu mg\frac{dx}{ds}$

Thus, Newton's Second Law gives,

$$m\frac{dv}{dt} = mg\frac{dy}{ds} - \mu mg\frac{dx}{ds} \qquad (1)$$

But, $\frac{dv}{dt} = v\frac{dv}{ds} = \frac{1}{2}\frac{d}{ds}(v^2)$. Thus,

$$\frac{1}{2}v^2 = g(y - \mu x) \Rightarrow v = \sqrt{2g(y - \mu x)} \qquad (2)$$

If a particle slides through an infinitesimal distance with a velocity, then the time required was $dt = \frac{ds}{v}$ where; $ds = \sqrt{1 + (\frac{dy}{dx})^2}$. Letting, $y' = \frac{dy}{dx}$ implies

$$t = \int \sqrt{\frac{1 + (y')^2}{2g(y - \mu x)}} dx \qquad (3)$$

Using Euler-Lagrange differential equation to find the minimum of (3) derives the solution to be

$$\begin{aligned} x &= a[(\theta - \sin\theta) + \mu(1 - \cos\theta)] \\ y &= a[(1 - \cos\theta) + \mu(\theta + \sin\theta)] \end{aligned} \qquad (4)$$

where a is the introduced constant.

2. Methodology

Notice that the solution reflected in (4) is a generalization of the equation of a cycloid (i.e. if the coefficient of friction   is zero, the solution reduces to an equation of a cycloid).

Verifying that (4) is indeed a brachistochrone is the main purpose of this paper. This is to find the traversal time of this curve given a predefined values of x, y, and μ and compare this time to the traversal time of a particle moving in an inclined path with the same predefined values. To do that, first note that the time in the brachistochrone is given by (3). Thus, deriving (4) with respect to θ yields

$$\begin{aligned} dx &= a(1 - \cos\theta + \mu\sin\theta) \\ dy &= a[\sin\theta + \mu(1 + \cos\theta)] \end{aligned}$$

By substituting x, y, dx, and dy in (1) yields

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$$t = \int \sqrt{\frac{a[1 - \cos\theta + 2\mu\sin\theta + \mu^2\cos\theta + \mu^2]}{g[1 - \cos\theta + 2\mu\sin\theta + \mu^2\cos\theta - \mu^2]}}\, d\theta \qquad (5)$$

Evaluating (5) in symbolic terms would be next to impossible; yet, one can evaluate it in numerical sense for the purpose of simulation. The following steps were implemented in numerical / symbolic software Matlab 6 (every step is necessary for the values needed in the simulation):

1. Find the value of the constant a (note that the horizontal component- x_0 vertical component- y_0 nd the coefficient of kinetic friction- μ of the traversal must be predefined). To do this, first divide the x_0 and y_0 to eliminate a, i.e.

$$\frac{x_0}{y_0} = \frac{[(\theta - \sin\theta) + \mu(1 - \cos\theta)]}{[(1 - \cos\theta) + \mu(\theta + \sin\theta)]} \qquad (6)$$

And, find the value of θ such that the right side of (4) would approximately equal to $\frac{x_0}{y_0}$. In this procedure, one might think of numerical root finding techniques as the best way of getting θ. In doing so, Bisection Method is the most appropriate since the function to be evaluated is of transcendental type. Such value of θ, say θ_0 can be used to find the value of a, i.e.

$$a = \frac{y_0}{[(1 - \cos\theta_0) + \mu(\theta_0 + \sin\theta_0)]}$$

2. Find the time t of (3) by evaluating the integral using Simpson's Rule for numerical integration. To do this, evaluate

$$f(\theta_i) = \int \sqrt{\frac{a[1 - \cos\theta_i + 2\mu\sin\theta_i + \mu^2\cos\theta_i + \mu^2]}{g[1 - \cos\theta_i + 2\mu\sin\theta_i + \mu^2\cos\theta_i - \mu^2]}}$$

for every step i in the Simpson's Integral.

3. Find the time of traversal of an inclined path by evaluating

$$t_{inclined} = \sqrt{\frac{2(x_0^2 + y_0^2)^{\frac{1}{2}}}{g(\sin\phi - \mu\cos\phi)}}$$

where $\phi = \tan^{-1}\left(\frac{y_0}{x_0}\right)$.

4. Simulate the result by using the points generated in step 2 and the points that can be determined over time increment in step 3.

5. By varying the values of x_0, y_0, and μ, data was collected and analyzed.

3. Results and Discussion

The program was made possible by the construction of a graphical user interface (GUI) for easy verification, further experiments and some explanations. Figures 2 and 3 show some of the snapshots of the simulation.
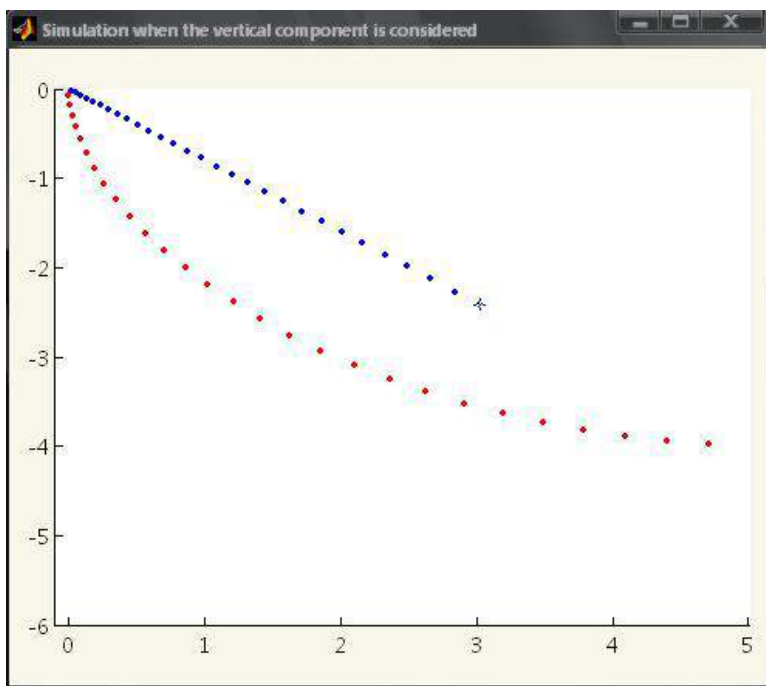
Figure 2. A GUI showing the simulation with 30 time increments.

Figure 2 presents the simulation of the conditions: horizontal component (5m), vertical component (4m) and a coefficient of kinetic friction (0.25). Clearly, by the time the brachistochrone curve reach the endpoint, the particle in an inclined did not finished the traversal (at 30 time increments). The time in the brachistochrone is 1.45030341554151 seconds while the time in the inclined is 1.74432554705255 with a difference of 0.29402213151104.
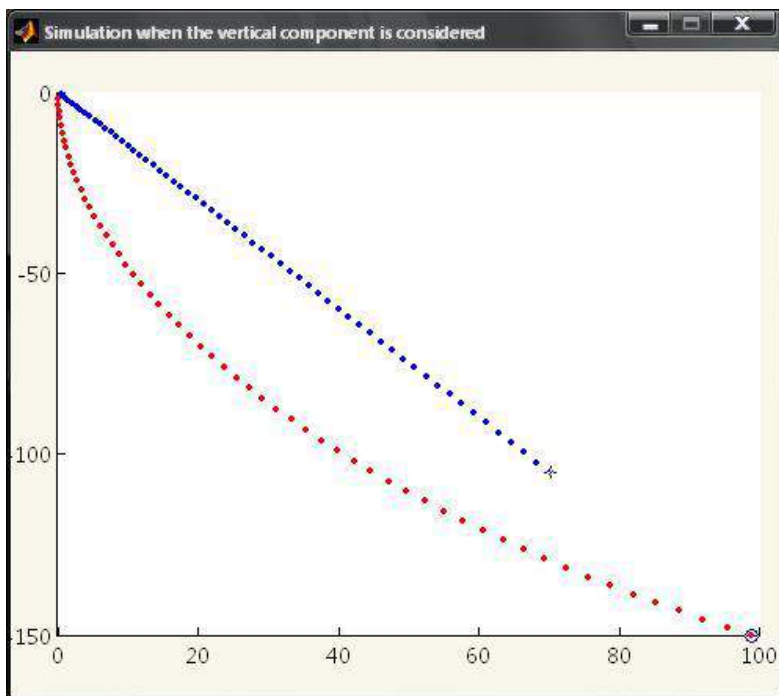
Figure 3. A GUI showing the simulation with 60 time increments.

Figure 3 presents the simulation of the conditions: horizontal component (100m), vertical component (150m) and a coefficient of kinetic friction (0.45). Also, by the time the brachistochrone curve reach the endpoint, the particle in an inclined did not finished the traversal (at 60 time increments). The time in the brachistochrone is 7.22849140948983 seconds while the time in the inclined is 7.94783771805981 with a difference of 0.71934630856998.

Table 1 shows the horizontal x and vertical y components, coefficient of kinetic friction μ, time of the brachistochrone t_b and the time in the inclined t_i.

x	y	μ	t_b	t_i	$t_i - t_b$
1	1	0	0.58319035	0.638876565	0.055686215
2	1	0	0.8059723	1.010152545	0.204180245
10	1	0	2.10471121	4.540071023	2.435359813
13	1	0	2.45391111	5.890150894	3.436239784
25	1	0	3.56140521	11.30288025	7.741475044
1	2	0	0.69430722	0.714285714	0.019978494
1	10	0	1.43386254	1.435696517	0.001833977
1	13	0	1.63235822	1.633633928	0.001275708
1	17	0	1.86493755	1.865849018	0.000911468
15	15	0	2.25868651	2.474358297	0.215671787
1	1	0.1	0.61016137	0.67343503	0.06327366
2	1	0.1	0.85913324	1.129384879	0.270251639
10	1	0.1	3.35537765	384434346.6	384434343.3
13	1	0.1	∞	∞	
17	1	0.1	∞	∞	
1	2	0.1	0.71649314	0.73284168	0.01634854
1	10	0.1	1.44062579	1.442929291	0.002303501
1	13	0.1	1.63621865	1.639953619	0.003734969
1	17	0.1	1.86505615	1.871361139	0.006304989
15	15	0.1	2.34245167	2.608202655	0.265750985
1	1	0.2	0.62112832	0.714285714	0.093157394
2	1	0.2	0.89321842	1.304101327	0.410882907
10	1	0.2	∞	∞	
13	1	0.2	∞	∞	
17	1	0.2	∞	∞	
1	2	0.2	0.72091524	0.752923252	0.032008012
1	10	0.2	1.44431725	1.45027249	0.00595524
1	13	0.2	1.63919742	1.646347225	0.007149805
1	17	0.2	1.86737636	1.876922403	0.009546043
1	20	0.2	2.02141257	2.033019532	0.011606962
15	15	0.2	2.40561964	2.766416676	0.360797036
1	1	0.4	0.65385476	0.824786099	0.170931339
2	1	0.4	1.00780018	2.258769757	1.250969577
10	1	0.4	∞	∞	
13	1	0.4	∞	∞	
17	1	0.4	∞	∞	
1	2	0.4	0.73878644	0.798595706	0.059809266
1	10	0.4	1.45032717	1.465301622	0.014974452
1	13	0.4	1.64421146	1.65936203	0.01515057
1	17	0.4	1.87151902	1.888195311	0.016676291
15	15	0.4	2.53236858	3.194382825	0.662014245
1	1	0.6	0.69202886	1.010152545	0.318123685
2	1	0.6	∞	∞	
10	1	0.6	∞	∞	
13	1	0.6	∞	∞	
17	1	0.6	∞	∞	
1	2	0.6	0.75626105	0.853734721	0.097473671
1	10	0.6	1.45583412	1.480807891	0.024973771
1	13	0.6	1.64887903	1.672690453	0.023811423
1	17	0.6	1.87546725	1.899673808	0.024206558
15	15	0.6	2.68021623	3.912303982	1.232087752
1	1	0.9	0.78630777	2.020305089	1.233997319
2	1	0.9	∞	∞	
10	1	0.9	∞	∞	
13	1	0.9	∞	∞	
17	1	0.9	∞	∞	
1	2	0.9	0.784661271	0.963142661	0.17848139
1	10	0.9	1.46391222	1.505018889	0.041106669
1	13	0.9	1.65575581	1.693299326	0.037543516
1	17	0.9	1.8813256	1.917290944	0.035965344
15	15	0.9	3.04535691	7.824607964	4.779251054

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Table 1 suggests that the time in the brachistochrone were smaller when compared to the time in the inclined. Also, infinite values of time were present at instances in which the horizontal component is much greater than the y component along with the increase of the coefficient of kinetic friction.

4. Conclusion and Recommendations

Conclusion

Indeed, the time of traversal of the brachistochrone yields a lesser amount when compared to an inclined path. During the implementation of the program, there were values of μ such that both paths yields infinite values. This indicates that even in the brachistochrone curve, there will be limitations to the traversal, if the coefficient of kinetic friction is too large.

Recommendations

The results of this study would be of great help to the quest of the minimum time of traversal in 'real' physical situations since it incorporates kinetic friction. But the time t in (3) and (5) are of integral implicit form; thus, the following recommendations for future studies may be explored: (a) approximation of the time in statistical sense, (b) algebraic explicit form of the time may be of great help for 'real' applications, (c) an equation for the limiting value of μ for the t of the traversal to yield infinite value.

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The LOWLANDS of LABO RIVER

Engr. Aldrich T. Caballo
Mary Lizbeth M. Caballo
Science Department

Abstract

Over the past 20 years, human activities along the banks of Labo River in Misamis Occidental have increased. The Local government has undertaken several pollution control efforts but pollutants have continued to degrade the river. This present study aims to serve as the baseline data needed by the Local government unit.

1. Introduction

An important source of drinking water and one of the major river systems of Misamis Occidental is Labo River. The river stretching approximately 42km., serves as the venue for washing, bathing, and other human activities. Over the past 20 years, these activities seem to have affected the physical and biological features of Labo River. As an apparent result, growth of fish and wildlife populations might have also been hampered. To address this problem, the local government has undertaken several pollution control efforts to improve water quality to save Labo River. Nonetheless, pollutants from a variety of sources have continued to degrade the river.

According to the US Environment Protecrion Agency, National Assessment Database, water quality data are used in a variety ways. Some of these are to: characterize water, identify trends over time, identify emerging problems, determine whether pollution control programs are working, help direct pollution control efforts to where they are most needed, respond to emergencies such as floods and spills. It is along these contentions that this study was conceived by the researchers.

The Problem

This study aimed at assessing the water quality of the Labo River in Misamis Occidental. Specifically, this study attempted to describe the characteristics of the river in terms of:
- a. Turbidity,
- b. Temperature,
- c. Water pH,
- d. Depth and Width of the river,
- e. Sediment type, and
- f. Water Velocity.

2. Methodology

This study was integrated as one of the laboratory activities of Natural Science 5 (Ecology & Field work), a 5-unit course taken by BSED students majoring General Science. Sampling was done from July 2006 to September 2006 from 7:00 to 9:00 in the morning. Five (5) sampling stations were identified, situated from Baranggay Labo of Ozamiz City to the Municipality of Clarin, Misamis Occidental. These sampling stations were labeled as: Station 1, Station 2, Station 3, Station 4, and Station 5.

Research Locale

Sampling Station 1 was the part of the river situated between Baranggay Molicay and Baranggay Labo; Sampling Station 2 was situated at the heart of Baranggay Labo, where many residents cross to reach the highlands of Labo; Sampling Station 3 was located adjacent to the runway of Ozamiz City Airport where the researchers observed a small-scale quarrying of sand; Sampling Station 4 was situated at Clarin, Misamis Occidental, near the bridge linking Gango, Ozamiz City and Clarin, Misamis Occidental; and Sampling Station 5 was the river's outlet flowing to the sea of Rama Beach, Clarin, Misamis Occidental.

On the next page is a map of the river showing the location of the five sampling stations.
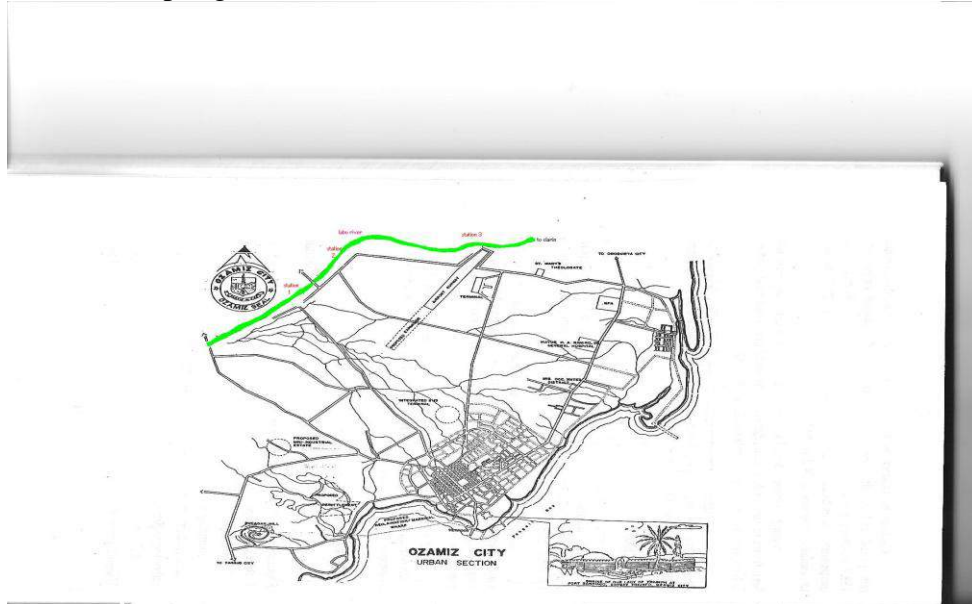
In each sampling station, the following parameters were measured: Turbidity, Temperature, Water Velocity, Depth of the river, Width of the river, Sediment type and Water pH.

Data gathering procedure

Turbidity

Turbidity measures the clarity of the water. It shows the amount of material either dirt or dissolved particles that are suspended in the water. With the absence of a precise instrument, **Turbidimeter,** the researchers utilized **Secchi disk** in measuring the water of the Labo river.

A Secchi disk is an 8" diameter (23 cm.) black and white disk attached to a chain or rope marked in meter increments. Inasmuch as

Secchi disk measurements are based upon the disk being lowered until it disappears, it cannot be used in rivers which are shallow or have low turbidity. In these cases, the Secchi disk reading had to be estimated as accurately as possible. Likewise, it was difficult to use the Secchi disk in fast river currents because the current might push the disk downriver, preventing an accurate measurement. A weight had to be added to the disk in this situation.

In this study, turbidity was measured through the following steps using the secchi disk. The researchers lowered the disk from a rock until it disappeared. It was made sure that the disk traveled vertically through the water and was not swung out by the river current. The number of centimeters on rope was noted after which the researchers pulled the disk to the surface of the river until it reapperared. Measurements were noted. The difference of the results from two observations was taken and was divided by two to get the level of the river's turbidity.

Student researchers measuring turbidity using the secchi disk

Temperature

Temperature was measured in degrees Celsius using a thermometer. The thermometer was lowered in the water at approximately one foot from the surface and temperature reading was taken after 3 minutes.

Water pH

     pH describes the acidity or alkalinity of water and represents the balance between hydrogen ions (H^+) and hydroxide ions (OH^-) in water. The value for pH is expressed on a scale ranging from 0 to 14. Solutions with more H^+ than OH^- ions have a pH value lower than 7 and are said to be acidic. Solutions with pH values higher than 7 have more OH^- than H^+ ions and are said to be basic, or alkaline. If the pH value is 7, the solution is said to be neutral (an equal number of H^+ and OH^- ions) and is neither acidic nor alkaline.

     The water pH was measured using a pH paper strip which was submerged in the water sample for at least 2 minutes. Different color patterns observed was then compared with a chart revealing the pH value. This study used a pH meter to measure the pH and temperature of the river. This instrument was complete with a probe and monitor showing the measured values in an electronic display (please r*efer to the illustration below).*

The pH meter used   *Researcher measuring the pH using the pH meter*

Depth and Width of the river

     The river's depth and width are affected by climate, precipitation, water runoff and erosion. The depth and width of the river were measured using a calibrated nylon string. The student researchers

(SR) used a life vest while measuring these parameters. In measuring the width, one SR held the string at one side of the river and another SR on the opposite side. In measuring the depth, one went into the middle of the river and lowered the string. A weight was added to the string to have it lowered easily (see *the picture below).*

Researchers measuring the depth and width of the river

Sediment Type

River substrates vary from muddy to sandy. Samples of the bottom sediment were collected and then examined to evaluate particle composition.

Water Velocity

The velocity of a river is the speed at which water flows with it. The velocity changes along the course of any river, and is determined by factors such as the gradient or how steeply the river is losing height, the volume of water, the shape of the river channel and the amount of friction created by the bed, rocks and plants.

Velocity of the water surface was measured using the simple equipments that include a stopwatch capable of timing in seconds, something to float on the water and a tape measure.

3. Results and Discussion

Physical Characteristics of Labo River

The physical characteristics of Labo River are described through the following parameters: turbidity; Water pH; depth and width; sediment type; and water velocity.

Turbidity is a measure of the cloudiness of water: the cloudier the water, the greater the turbidity. Such would mean that the lower the value, the murkier the water tends to be. Turbidity increases as a result of suspended solids in the water such as suspended particles, plankton, industrial wastes, and sewage. Thus, the suspension of these materials would gradually reduce the transmission of light from the sun.

Table 1 shows the turbidity values from Station I to Station V.

Table 1
Turbidity Values from Station I to Station V

STATION	TURBIDITY (cm)
I	0.5
II	0.5
III	1.0
IV	3.3
V	4.33

As reflected in Table 1, the river becomes less turbid or clearer as it reaches or joins the sea. The suspended particles, which would absorb heat from the sunlight, would make water turbid and become warmer thereby reducing the concentration of oxygen in the water. As

this occurs, some organisms could not survive in that affected area of water.

Table 2 shows the temperature of the five sampling stations.

Table 2
Water Temperature of the Five Sampling Stations

STATION	TEMPERATURE (^{0}C)
I	26.1
II	26.2
III	25.3
IV	24.6
V	26.3

Table 2 displayed that higher temperatures were noted at stations with higher turbidity. It can be noted that Sampling Station IV has the lowest temperature while Sampling Station V got the highest.

Labo river's acidity or alkalinity is depicted on Table 3.

Table 3
pH values of the Five Sampling Stations

STATION	Ph
I	7.3265
II	7.41
III	7.587
IV	7.428
V	7.4

As reflected in the Table above, the pH values from Stations I to V did not vary much. It simply means that at this stage, Labo River is fit to sustain aquatic life.

The physical characteristic of Labo River in terms of its depth and width is shown in Table 4.

Table 4

Depth and Width measures of the river

STATION	Depth (m)	Width (m)
I	1.0	9.67
II	0.75	11.96
III	0.42	12.95
IV	2.43	25.39
V	1.71	33.22

It is reflected in the Table above that sampling station IV got the highest depth while sampling station V got the highest width.

Sediment type is one of the factors that affect the turbidity of the river. Substrates that are made of finer particles such as mud are easily carried by the water current and the particles are frequently stirred up by bottom feeders.

Sediment types collected from Labo River are presented in Table 5.

Table 5

Sediment Type Collected from
the Five Sampling Stations

STATION	Sediment Type
I	Combination of rocks and mud
II	Combination of rocks and mud
III	Sandy
IV	Muddy
V	Combination of sand and mud

The Table above reveals that Stations I and II are primarily composed of mud, which is one of the sources that contribute to the high turbidity of the river.

The River's water velocity as taken from the five sampling stations is depicted on Table 6.

Table 6

Water velocity of the river from Station I to Station V

STATION	Depth (m)	Width (m)	Water Velocity (m/s)
I	1.0	9.67	0.57
II	0.75	11.96	0.33
III	0.42	12.95	0.68
IV	2.43	25.39	0.16
V	1.71	33.22	0.084

Among the sampling stations, Station III got the highest water velocity seconded by Station I. Station V on the other hand, got the lowest water velocity. One of the factors why velocity decreases is tidal activity. This could be the reason why Station V got the lowest velocity.

4. Summary, Conclusion, and Recommendations

The obtained data generated the following findings:

1. The river became less turbid or clearer as it reached or joined the sea..
2. Higher temperatures were noted at stations with higher turbidity, specifically Stations I and II. However, these temperatures were within the optimum temperature range for breeding aquatic life which is $21^0C – 29^0C$.
3. The pH of the water from Station I to Station V did not vary much and were still within the optimum pH for breeding aquatic organisms.
4. Water velocity decreased as the river joined the sea. Although, higher rates were noted at Stations I and III.
5. The river substrate was primarily made of mud which contributed to the high turbidity of the river.

Conclusion

Data reveals that the pH, temperature and turbidity values of Labo River were within the optimum range to support aquatic life; hence, the River is not dead.

The Researchers on the go

Recommendations

Though, at Station 3, researchers observed a small-scale quarrying activity and in Station 4, residents were using the river as a dumping site for garbage. Furthermore, a veneering plant was seen within the vicinity of Station 4 (refer to the pictures below). These pollution-related activities could soon overtake Labo River, making the river unsafe for humans and possibly destroy the flora and fauna of the river.

To closely monitor the changes of the physical characteristics of the river, the researchers recommend that a year-long study must be conducted focusing on the pH, temperature, and turbidity parameters to cover the effect of seasonal changes. Another study could be made to evaluate the river's salinity and its ability to sustain fish and aquatic resources.

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Acknowledgement

The Economic Profile of Subanen Families in Sitio Opol, Catadman, Ozamiz City

Eunel P. Malig-on
Social Science Department

Abstract

The Subanens are an indigenous ethnolinguistic group living in the hinterlands in northern, western, and southern portion of Zamboanga peninsula, Minadanao.Originally, they lived along riverbanks or Suba; hence, the name Subanen.

This study aimed to know how the 44 Subanen families managed to live in the mainstream society and made the transition from their traditional way of life to what we might call modern living in the coastal area of Barangay Catadman, Ozamiz City.

1. Introduction

Economics, derived from the Greek words "oikos" (house) and "nemein" (to manage), literally means household management. In a self sustaining family like that of a Filipino farmer, the members of the household did their own building, tilled the land, prepared their own food and made the most of their own clothing (Fajardo, 1998).

Today, in the context of how individuals strive to provide the basic needs of the family like food, shelter, and clothing and how they manage the household reflect the economic status of the family. In which case, every Filipino family varies in their out-lived experiences in terms of their standard of living condition.

The Subanen people are known as the aborigines of the Island of Mindanao and there are more than 400,000 of them today (www.adzu.edu.ph/api/publication). They are an indigenous ethnolinguistic group found mostly in the northern, western, and southern portions of Zamboanga Peninsula. They were originally found along river banks or "Suba"; hence, the name subanen. Since then, a

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significant number have lived in the hinterlands of the peninsula. There, they struggle to hold on to their traditional way of life even as they also struggle to come to terms with the modern world but for more than 30 years, no study has been done on the economics of the Subanens, how they manage their households, how individual members of the family provide for their basic needs.

In the early 70's, because of insurgency problem, there were about 60 Subanen families who migrated to the coastal areas of barangay Catadman from the mountainous areas of Misamis Occidental. It had always been their attitude to do things communally, so when they left and migrated to the lowland area they lived as a community. In the late 70's, through their concerted efforts led by their timuay or chieftain and in coordination with the local government of Ozamiz, they were granted a permanent resettlement area.

Statement of the Problem

This study aims to find out the profile of the Subanen families in Sitio Opol, Brgy. Catadman, Ozamiz City. Specifically, it attempts to answer the following questions:
1) What is the profile of the Subanen families in Sitio Opol, Brgy. Catadman Ozamiz City in terms of:
    a) Household membership
       a.1 Size of the family
       a.2 Type of family
       a.3 Civil status of the household members
    b) Educational attainment
    c) Source of income
2) What is the living condition of the household in terms of:
    a) Survival
       a.1 Food and nutrition
       a.2 Health
       a.3 Water and sanitation
       a.4 Clothing
    b) Security
       b.1 Shelter

b.2 Peace and order/ Public safety

Significance of Study

Sitio Opol, Brgy. Catadman is the new partner Barangay of La Salle University (LSU) in Ozamiz City. Its Social Concern Office (SCO) had adopted Sitio Opol for its extension services; thus, this study is significant for SCO and LSU to know the situation of the Subanens in this place.

This study may also serve as a reference or basis of the local Government officials for their barangay development plan and any possible income generating projects for their constituents.

It is also known that there are organizations like NGO, Private Institutions and silent individuals who are more than willing to ease the burden of others in whatever means. Thus, it is hoped that this study serve as one step for their many interesting outreach activities and programs.

Scope and Limitations of the Study

This study is limited to the profile of the Subanen families in the year 2006-07. It involves the entire Subanen household in this resettlement area situated in Barangay Catadman, Ozamiz City.

This study primarily centers on the economic status of the Subanen families concerned and confined only to this place. Findings of the study would therefore, be true only for the subjects concerned and for the given period of time, although these could be used as basis for similar studies.

2. Methodology

The respondents were a total of 44 households residing in Sitio Opol, Catadman, Ozamiz city.

A questionnaire in English was adapted from Soprex Foundation (2005) which is the Southern Philippines Research and Extension Foundation Inc. based in Mindanao State University. The question nnaire contained items describing the existing situations of the Subanens in Sitio Opol, Catadman, Ozamiz City

To enable the researcher to officially administer the questionnaire to the respondents, a letter was written addressed to the Brgy. Captain of Barangay Catadman, Ozamiz City, and seeking permission for this said purpose.

The distribution of the research instrument was personally done by the researcher to guarantee strict compliance on the directions provided in the instrument, ensuring an accurate collection of data as well as an assurance of immediate and early retrieval of the questionnaire.

Since the questionnaire was in English, directions in the mother tongue were provided by the researcher to help guide the respondents on how to go about each items. Furthermore, informal interviews were conducted to clarify some points provided by the respondents.

The responses that were gathered were classified tallied for tabular presentation and textual interpretation and analysis. All data were presented and expressed in frequency and percentage.

3. Results and Discussion

The distribution of respondents according to Family Size is shown in Table I.

Table 1
Family Size

Family Size	Frequency	Percentage
2 – 5	17	38.64 %

6 – 10	25	56.82 %
11 – 15	2	4.55 %
	N= 44	100%

The Table presents the quantitative description of the respondent's family size. As shown, 56.82 % is composed of six to 10 members. This means that the majority of the families in this area are considerably big though there are only 2 families having 11-15 members. They are economically challenged; yet, their household members are numerous. Thus, we can say that family planning has not been significantly practiced among these families.

The distribution of the respondents according to Gender is shown in Table 2.

Table 2
Gender

Male	116	44.96 %
Female	142	55.04 %
	N = 258	100%

In the 258 people in the Sitio Opol, Barangay Catadman, Ozamiz City, 44.96 % are males and 55.04 % are females. This means that majority of the population in the area are females which based on observation in the local and national scene, females always out- number the males in many different places.

The distribution of the respondents according to Age is shown in Table 3.

Table 3
Age

Age Group	Frequency	Percentage
1-10	45	17.44%
11-15	33	12.79%
16-25	91	35.27%

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26-35	31	12.01%
36-45	22	8.53%
46-65	26	10.08%
66-75	10	3.88%
	N= 258	100%

From the quantitative presentation, it can be said that majority of the populace in Sitio Opol, Barangay Catadman are children and teenagers. Put together 65.50 % comprises the young generations which is more than 50 % of the total population. This means that many of the families in the area comprise a considerable number of young people outnumbering the old.

The distribution of the respondents according to the Civil Status is shown in Table 4.

Table 4
Civil Status

Single	129	50 %
Married	114	44.18 %
Single Parent	15	5.81 %
	N= 258	100%

Since majority of the populace in the area are children and teenagers it also follows that many, 50 % are not yet married; 44.18 % or a considerable number are married. We can infer that most of the people in the area who are not children are married. There are also some that is, 5.81 % who became single parent.

The distribution of the respondents according to Education is shown in Table 5.

Table 5
Education

Academic level	Frequency	Percentage
None	40	15.50%

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Elementary	103	39.93%
High School	98	37.99%
Vocational	7	2.71%
Vocational Graduate	7	2.71%
College	3	1.16%
College Graduate	0	0
	N = 258	100%

The Table indicates that nobody among the Subanens had graduated from college. Most of them, 77.92 % are either in elementary or high school level/graduates. This is so because they are preoccupied with the basics of survival. As soon as they, at least, learn basic reading or writing they drop from school and look for jobs to earn a living and help their parents. Because of impoverishment, education is not their primary concern.

The distribution of the respondents according to Academic Activities is shown in Table 6.

Table 6
Academic Activities

Not anymore in school	145	56.20
Still in school	113	43.80
	N= 258	100%

Since majority of the populace in the area are children and teenagers, there is considerable number, that is, 43.80 % who are still in school. However, it didn't follow that because the former are majority then those who are in school are also the same number. The trend is after learning the basic or spending few years in elementary or high school on any had stopped in order to address their primary need, that is, survival. This is revealed in the 56.20 % of populace who are not anymore in school.

The distribution of the respondents according to their Present Occupation is shown in Table 7.

Table 7
Present Occupation

Present Occupation	Frequency	Percentage
Mango Sprayer	2	0.78 %
Fisherman	41	15.89 %
Businessman (Vendor)	22	8.52 %
Driver (Sikad)	85	32.95 %
Housekeeper (House wife)	44	17.05 %
Domestic Helper	1	0.39 %
Yaya	2	0.78 %
Dispatcher	1	.39 %
Saleslady	2	.78 %
Security Guard	3	1.16 %

There is considerable number of the populace that is 32.95 % who are sikad-sikad drivers. This is probably because of lack of education, driving sikad answers their daily basic needs immediately. The second big group are fishermen. Since they live along the coastal area, fishing directly answers their need to survive. There is also a big number that is, 8.52 %, engaged in small business like vending. This is the third most engaged occupation because they also live close to the city where vending clicks.

The distribution of the respondents according to Family income is shown in Table 8.

Table 8
Family Income

Family Income	Frequency	Percentage
P 50 – P 500 monthly	25	56.82 %
P 501 – P 1000 monthly	15	34.09 %

P 1001 – P 10,000 monthly	4	9.09%

As revealed in the Table, a majority of them, 56.82 % earn in the range of 50 to 500 pesos a month. This can be explained by their being sikad drivers and fishermen which doesn't give or pay much. Meanwhile, 34.09% earn in the range of 500 to 1000 pesos monthly. This is so because many are into small business like vending goods. There is also 9.09 % earning in the range of 1000 to 10,000 pesos monthly. This is closely attributed to those who are working in business establishments as sales ladies, security guards, or housemaids.

The distribution of the respondents according to Physical Survival is shown in Table 9.

Table 9
Physical Survival

a) Food & Nutrition		
Yes	34	77.27 %
No	10	22.73 %
b) Health		
Yes	28	63.64%
No	16	36.36 %

Based on the Table, there are 77.27 % who said that, all newborns have at least birth weight of 2.5 kgs. There are no severely and moderately underweight children under 5 years old. All pregnant lactating mothers are provided with supplements like iron and iodine. Infants are breastfed also for at least 4 months. 2.79 % has said that all birth deliveries are attended by trained personnel and many children of 1 year old and below are fully immunized. There is not more than 1 diarrhea episode per child below 5 years old and no death in the family due to preventable causes within a year. Many couples have begun practicing family planning in the last 6 months. Solo parents also avail of health services provided by the city government.

The distribution of the respondents according to Drinking Water Source is shown in Table 10.

Table 10
Source of Drinking Water

Sources of Drinking Water	Frequency	Percentage
Private Water Works	6	13.64 %
Private Pumps or Artesan Wells	8	18.18 %
Public Faucet/ Public Artesan Well	18	40.91 %
Purchase Water	12	27.27 %

Most Subanens, 40.91 % have said that their water source is from a public faucet/ public artesan well. Some 13.64 % have said that they get their water from private water works or the Misamis Occidental Water District (MOWD) and 18.18 % have said that get their water from private pumps or artesan wells.

The distribution of the respondents according to the Toilet facility is shown in Table 11.

Table 11
Toilet Facility

Toilet Facilities	Frequency	Percentage
Flush	4	9.09 %
Pall System	12	27.27 %
Antipolo System	6	13.64 %
Open Pit	22	50 %

In toilet facility, 50 % uses an open pit, while, only 9.09% has flushing facilities.

The distribution of the respondents according to Owning a House is shown in Table 12.

Table 12
Owning a House

Nature (Owning or Renter House)	Frequency	Percentage
Rented	1	2.27 %
Owned	42	95.45 %
Free Housing Courtesy of Employment	1	2.27 %

As the Table reveals 95.45 % of the Subanens owned the house they are living in the land granted them by the government. It could be that the 2.25% renting was not one of theose Subanens of the 1970's.

The distribution of the respondents according to their House Materials is shown in Table 13.

Table 13
Primary Material of the House

Primary Material of the House	Frequency	Percentage
Mostly Cement	2	4.55 %
Mixed Cement and Wood	3	6.82 %
Mostly Wood	35	79.55 %
Mostly corrugated roofing Materials	1	2.27 %
Cogon/Nipa/Anahaw	3	6.82 %

Majority of the Subanen households, 79.55%, have houses which are primarily made of wood. They claim, it is the material affordable for them which imply their economic status.

The distribution of the respondents according to Access to Electricity is shown in Table 14.

Table 14
Access to Electricity

Houses (With or Without Electricity	Number	Percentage
YES	39	88.64 %
NO	5	11.36 %

Majority of the households have electricity in their house. This means that electricity is of necessity and they are willing to spend for it.

The distribution of the respondents according to their Owned Appliances is shown in Table 15.

Table 15
Owned Appliances

Owned Appliances	Frequency	Percentage
Cellphone	7	15.91 %
TV	24	54.55 %
Radio	16	36.36 %
VCD	3	6.82 %
DVD	5	11.36 %
Video Games	1	2.27 %
Electric Fan	8	18.18 %
Electric Stove	1	2.27 %
Electric Iron	3	2.27 %
Washing Machine	3	6.82 %
Gas Stove	3	6.82 %
Jeep	2	4.55 %

The most owned appliances of the households in Sitio Opol are TV and Radio. This means that the household entertainment comes from television and radio. Other owned appliances as reflected in the Table are very minimal.

The distribution of the respondents according to Peace/Order and Public Safety is shown in Table 16.

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Table 16
Peace/Order and Public Safety

Criminality Incidents	Frequency	Percentage
YES	14	31.82 %
NO	30	68.18 %

As shown in the Table above majority of the households or 68.18% expressed that there is no incident of crime committed against any household members in the area. Nor, had there been any crime committed against their property (theft, burglary, etc.) and no family members have been victimized by armed conflict.

4. Summary, Conclusion, and Recommendation

Two hundred fifty-eight Subanens composed 44 households living in Sitio Opol, Barangay Catadaman, Ozamiz City. There are more females than the males. Majority of the populace are children and teenagers. Of the 258 people, 114 are married, 15 single parent, and the rest are single who are mostly children and teenagers. One hundred thirteen of them are still in school but as results show nobody has gone to finishing high school. Many look for work immediately to earn a living to help their families.

The Subanen people in Sitio Opol, Barangay Catadman are plunging into impoverishment, if not really poor. Most of them are sikad drivers, and fishermen; some also are vendors, others are employees but very minimally. Majority of them earn only in the range of P 50-500 monthly.

Most of them owned the houses they are living in though it is just small or barong barong type. Their most common toilet facility is the open pit type. Only 5 households don't have electricity so the rest, with electric power installation owned appliances such as TV, radio,

and electric fan. Their water sources are mostly from public faucet, flowing /spring and open wells or artesan wells.

Despite this, they don't have much problem with malnutrition nor have they suffered from epidemic or other communicable diseases in the area. This is attributed to their access to health services.

Generally, Sitio Opol is peaceful. There had not been any crimes committed against any of their household members nor in their properties. Neither is there who has been victimized by armed conflict.

Taking into account the findings of this study, the researcher arrives at the following recommendations: In the development plan of the Local Government of Ozamiz City through Barangay Catadman, Sitio Opol should be one of their top priority especially when it comes to livelihood or income generating projects.

For an outreach or extension program, NGO's or any cause-oriented organizations /institutions can prioritize the non-formal supplementary or remedial educational program, that is, after addressing their basic issue of survival.

On the other hand, La Salle University as a partner of this Sitio should plan with the residents possible programs or activities to address their fundamental concerns which are poverty and education.

5. List of References

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Determination of Nitrite concentration in Chorizo and Hotdog samples from Ozamiz City Public Market

Mrs. Maria Cristina M. Llauder
Engr. Evelyn Joy D. Neri
Science department

Abstract

The determination of nitrite concentration in chorizo and hotdog samples from the three stall owners in Ozamiz City Public Market was conducted in La Salle University Chemistry Laboratory and Mindanao State University- Iligan Institute of Technology Chemistry Laboratory. Four replicates were made for each sample three manufacturers. The nitrite levels for raw and cooked samples were separately determined using the method established by Association of Official Analytical Chemist (AOAC).

1. Introduction

Food is so important for survival since it is a basic human need. Good health is impossible without good nutrition. Food, the very vehicle of health and life-giving nutrients, may be underused, overused, abused or misused. As such, it would result in some forms of food-related problems. Nonetheless, food, if used properly, can help build up and restore health.

Preservation of foods has been practiced throughout the history of human civilization. There are several means of preserving foods: salting, smoking, and curing.

Cured meats which are preserved or processed foods, are sold at the market by established food companies or by local manufacturers. However, cured meats made by these local manufacturers or small stall owners should always be evaluated in terms of quality and safety since they do not have substantive systems in attaining quality control of their foods as compared with large manufacturing companies. A case in point would be the food additives which are added to local foods. Such may cause health problems. For instance, nitrite used in meat curing in

the form of sodium or potassium salt is useful and beneficial if used properly, but hazardous to health if used excessively. For this reason, guidelines are set by the Philippine Bureau of Food and Drugs (BFAD) in processing foods and adding food preservatives.

With the above scenario, this endeavor was conducted in the hope of providing pertinent data anent to nitrite level in cured meats sold at the different stall owners in Ozamiz City. This study was intended as a form of monitoring device in yielding quality local meat products in the city.

Theoretical Framework

Nitrite, which is carcinogen-potential, poses a great concern among people eating cured meats. Nitrites when taken into the body form nitrosamines in the stomach by a process called N-nitrosation (Getty, 1998). Nitrosamines, according to Deman(1980), are powerful carcinogens and may also be mutagenic and tetratogenic. Accordingly, nitrites react with hemoglobin in human blood to produce methemoglobin, which limits the ability of red blood cells to carry oxgen, causing a condition called methemoglobinemia or 'blue baby' syndrome (Murphy, 2000).

Human exposure towards nitrite not only comes from cured meats but also on vegetables containing large level of nitrate when it comes in contact with human saliva. However, vegetables are rich in antioxidant such as ascorbate, erythorbate, and tocopherols which gradually inhibit potential nitrisamine formation in the body, Getty stressed (1998). Thus, lower level of nitrite is considered safe because it delays the development of botulinal toxin which inhibits and outweighs the potential production of malonaldehyde deemed to destroy the human body (Epley, Addis and Warhesen, 2002).

For the curing process, sodium nitrite legally can be used up to certain levels as set by the U.S. Meat Inspection Regulations, Title 9, Chapter 111, Subchapter A, Code of Federal Regulations, 1974

BRITISH UNIT	ENGLISH UNIT
2 pounds per 100 gallons pickle brine at the 10% pump level in the product.	907.03 grams per 378.80 liters pickle brine at the 10% pump level in the product.
1 ounce per 100 pounds meat (dry cured)	0.625 milligram per gram meat (dry cured).
¼ ounce per 100 pounds chopped meat and/or meat by products.	0.156 milligram per gram chopped meat and/or meat by products.

(Epley et al, 2002)

The level of nitrite in cured meat made by the local manufacturers sold in the different markets in Ozamiz City has not been properly monitored. Along this vein, the researchers were prompted to conduct this study capitalizing the guidelines set by the U.S. Food and Drug Administration.

Statement of the Problem

The study aimed to determine the concentration of nitrite in selected raw and cooked chorizo and hotdog samples bought in Ozamiz City Public Market.

Specifically, this study sought to answer the following questions:

1. What is the nitrite level expressed in milligrams per gram meat in raw and cooked chorizo and hotdog samples?
2. Is there any significant difference in nitrite concentration of the samples with the standard nitrite concentration set by the U.S. Meat Inspection Regulations?
3. What happens to the nitrite level of chorizo and hotdog samples when cooked?
4. Does the nitrite concentration among three samples differ significantly for chorizos and hotdogs?

Hypotheses

     1. The nitrite level of raw and cooked samples sold in Ozamiz City Public Market is within the level set by U.S. Meat Inspection Regulations.

     2. There is no significant difference in nitrite concentration of the samples with the standard nitrite concentration set by the U.S. Meat Inspection Regulations.

     3. The nitrite level of raw chorizo and hotdog samples does not changed when cooked.

     4. The three samples for chorizo and hotdog have no significant difference in their nitrite concentration.

Significance of the Study

     The findings of this study will be beneficial to the consumers, DTI Per, Educ researchers.

     The results of the study may serve as a functional avenue among the consumers on the safetiness of the locally manufactured chorizos and hotdogs they are buying in the Ozamiz Public Market. This results will also serve as a viable springboard for the researchers in coming up with studies relevant in enhancing their knowledge and skills in determining nitrite content of other foods displayed in the market. Moreover, the findings of this endeavor will valuably provide DTI personnel with updates and feasible insights on the safety and quality of the food sold in the involved market. Thus, they can easily execute proper monitoring scheme to bar possible negative effects on the buying public.

Scope and Limitations

     The study determined the nitrite levels of raw and home cooked chorizo and hotdog samples obtained from three selected identified dealers of Ozamiz City Public Market. The processing and expiration dates were not taken into consideration because product dealers usually took this information for granted.

Review of Related Literature

In prehistoric times, caveman may have smoked meats to make them better. In coastal regions, early man probably soaked foods, including meat and poultry, in seawater for better flavor and for preservation. The spice trade between Asia, the Middle East, and Europe flourished because the public demanded the flavors that species added to foods. Early explorers went in search of salt and spices, and wealthy Romans were kidnapped for ransom of salt and spices.

"Food preservatives" is defined as any substance used to provide a technical effect in foods (Brain, 1997). The use of food preservatives has come more prominent in recent years, due to the increased production of prepared, processed, and convenient foods. Preservatives are used for flavor and appeal, food preparation and processing, freshness and safety.

Today, nitrites according to Epley and others (2002) used in curing meat are produced commercially as sodium nitrite.

Sources of Nitrite

Aside from the foods to which nitrite is added like bacon, fermented sausage, hotdogs, bologna, salami, corned beef, ham, and other smoked or cured meat, fish, and poultry, exposure of nitrite may also come from vegetables. Green leafy and root vegetables, such as spinach and carrots, provide more than 85% of dietary nitrate, which may be converted to nitrite by the human body during digestion (Getty, 1998).

Dietary nitrate may also come from drinking water. Though the government agency, EPA, has set a maximum limit for nitrite in drinking water. Thus, the levels of nitrate in water vary greatly and may be quite high in some locations. Nitrite content in both drinking water and vegetables is influenced by the use of nitrate fertilizers.

Detrimental Effects of Nitrites

Nitrite has been the center of controversy because it is potentially carcinogenic (Harris, 1982). Although not a carcinogen in itself, the major concern about its use was generated when it was realized that secondary amines in food may react to form nitrosamines (Deman, 1980).

Nitrites will also form nitrosamine in the human stomach by a process called N-nitrosation (Getty, 1998). Nitrosamines are powerful carcinogens and they may be mutagenic and tetratogenic as well (Deman, 1980). As such, lower doses of N-nitosation can cause methemoglobinemia particularly in infants, resulting from conversion of nitrate to nitrite after consumption (Epley et al, 2002).

Nitrite in Meat

In the last two decades, various authority bodies in the United States made a number of human health based recommendations concerning cured meat consumption. In 1981 and 1982, the National Academy of Sciences (NAS)/National Research Council (NRC) issued reports summarizing available scientific evidences concerning nitrite-cured meat and offered implications and recommendations (NRC, 1981, 1982). The findings from the first report (NRC, 1981) were that nitrite itself was not carcinogenic, but there was some concern about the potential toxicity and carcinogenicity from certain metabolites that might result from its use. Further research was recommended along with the institution to measure decreasing exposure to nitrite and its metabolites but not the risks of jeopardizing the ability of nitrite to protect against botulism and food spoilage (Brain, 1997).

The follow-up report (NRC, 1982) examined alternatives to the use of nitrite in foods, suggestions regarding partial or complete nitrite alternatives, along with the recommendations about the use of agents for blocking or inhibiting the formation of nitrosamines. Some of these recommendations were implemented, and other changes were made by

the cured meat industry, however, an effective replacement for the antibotulinal effects of nitrite has not been form (Brain, 1997).

To determine how much residual nitrite in US cured meats, Prof. Cassens of the University of Wisconsin conducted three trials, retrieving cured meat from supermarket cases in Wisconsin, Los Angeles, Denver, St. Louis, and Tampa. Publishing his findings in February 1997, Cassens found that the current residual nitrite content of cured meats was approximately 10 ppm. This amount is approximately one-fifth (1/5) the level 25 year ago (Getty, 1998).

In the Philippines, there is no published information gathered by the researchers concerning the level of nitrite in cured meats sold in the said public market.

2. Methodology

The study made use of the descriptive-comparative type of research. Descriptive because it sought to determine the amount of nitrite present in cured meats like chorizo and hotdog, and comparative because it sought to compare the nitrite concentration in the sample with the standard nitrite concentration set by the U.S. Department of Agriculture through the Meat Inspection Regulations. In like manner, the study also compared the nitrite concentration between the raw and cooked chorizo or hotdog samples.

The data of the study were collected through the use of colorimetric method of analysis found in the publication of the Association of Official Analytical Chemist (AOAC).

Random samples were taken from three manufacturers in Ozamiz City Public Market. The samples consisted of one dozen chorizo and one-half kilo hotdogs. The analysis was conducted at the La Salle University Chemistry Laboratory and Mindanao State University College Chemistry Laboratory. The study used the available instruments and facilities found in the laboratory.

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Preparation of Nitrite Standard Solutions

Approximately 1.000 g of reagent grade $NaNO_2$ was dissolved in 1000 ml water. 100 ml aliquot was placed in 1000 ml flask and diluted to volume. An aliquot of 10 ml was diluted to 1000 ml.

Preparation of Standard Calibration Curve

A series of solutions containing 0 – 45 ml with an increment of 5 mL standard solution was added with 2.5 mL sulfanilamide reagent. After 5 minutes, 2.5 mL of NED reagent was also added. It was then diluted to 50 ml and allowed to develop for 15 minutes. The absorbance was read at 540 nm against a blank containing all the other reagents except the sample. A plot of the concentration versus absorbance was obtained. The best fit line was obtained by least square method.(see Appendix J for the equation).

Determination of Nitrite Concentration

Nitrite levels of raw and cooked samples were separately determined. Approximately five grams of finely ground samples was thoroughly mixed and weighed in a 50 mL beaker. Then 40 mL of water heated to 80^0C was added and mixed thoroughly to break up all lumps. It was then transferred to a 500 mL volumetric flask and brought to a 300 mL volume by adding hot water. The flask was heated in a steam bath for 2 hours with occasional shaking. The solution was cooled, diluted to volume with water, mixed and filtered. 2.5 ml of sulfanilamide reagent was added to a 50 mL volumetric flask containing 10 mL aliquot. After 5 min, 2.5 mL of NED reagent was added, mixed then diluted to volume. The color was allowed to develop for 15 min. and the absorbance of a small portion was photometrically determined at 540 nm against blank.

For cooked samples, the chorizos and hotdogs were cooked first by frying and was prepared in the same manner as the fresh samples.(see Appendix E for the Schematic Diagram for Procedures).

The concentration of nitrite in the samples was determined by interpolating its absorbance in the standard calibration curve. For the calculation of the concentration of nitrite in the solution of sample, please see Appendix J.

To determine whether the cured meat products contained at most 0.156 mg nitrite per gram cured meat, the t-test was employed. The test is a right tailed test at 10% significance level which corresponds to $\propto = 0.10$. If the test statistics fall in the critical region, it implies that cured meat contains a significant amount of nitrite more than the standard concentration, if otherwise, the nitrite in cured meat is within the standard concentration. The critical t value which corresponds to the critical region is 1.638 for three degrees of freedom and 1.886 for two degrees of freedom (see Appendix J for the computation of the test statistics and Appendix G for the T Distribution Table).

One way Analysis of Variance (ANOVA) was also used to test for the equality of the three samples in raw and cooked chorizo and hotdog on its average nitrite concentration.

The significant level employed in this test was 0.05. The F critical value (F_{crit} was obtained using the F distribution (see Appendix H for the Table of F Distribution and Appendix I for the calculation of ANOVA).

3. Results and Discussion

The arrangement of the presentation corresponds to the sequence of the sub-problems of this endeavor. Hence, the discussions of the results are given after the tables and graphs.

Standard Nitrite Calibration Curve

Figure 1 shows the data used in preparing the standard nitrite calibration curve which was presented as Figure 1.

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STANDARD NITRITE CALIBRATION CURVE

Concentration in mg nitrite per Liter (ppm)
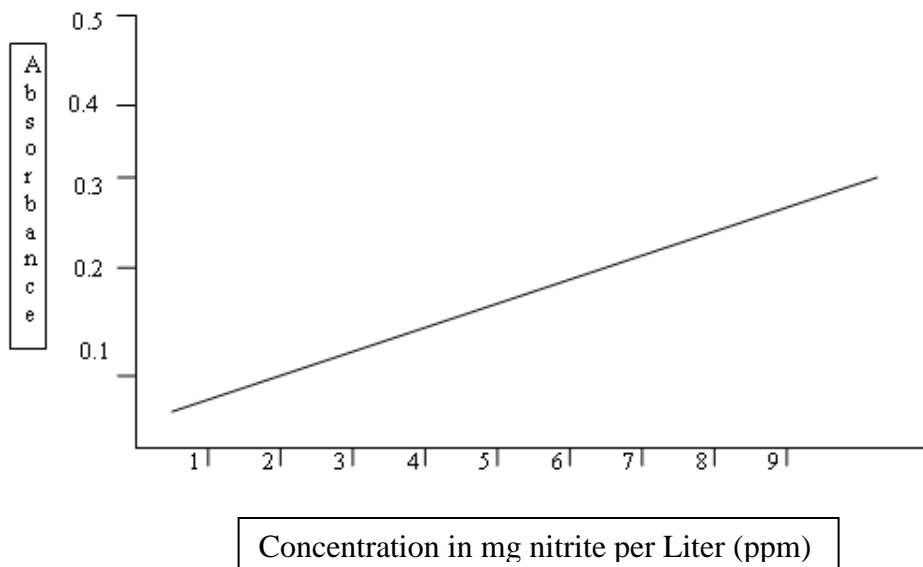
Figure 1

The standard nitrite calibration curve is used to determine the concentration of nitrite in all sample solutions in this study.

Nitrite in Chorizo

Nitrite in raw and cooked chorizo.

Tables 1 and 2 show the average nitrite concentration expressed in milligram per gram sample.

Table 1
Standard Nitrite Calibration Curve

Volume of Standard	Concentration (ppm)	Absorbance at 540nm
Blank	0.000	0.000
10	0.201	0.090

15	0.301	0.133
20	0.401	0.188
25	0.501	0.227
30	0.602	0.267
35	0.702	0.313
40	0.803	0.357
45	0.903	0.374

Table 2

Average Nitrite Concentration of Raw Chorizos for Four Trials

Sample	Absorbance	mg nitrite per gram sample	Standard Deviation
A	0.017	0.021	0.002
B	0.126	0.136	0.009
C	0.372	0.418	0.011

Standard Nitrite Concentration = 0.156 mg nitrite per gram cured meat.

Table 3 represents the average nitrite concentration of cooked chorizo for four trials.

Table 3

Average Nitrite Concentration of Cooked
Chorizo for Four Trials

Sample	Absorbance	mg nitrite per gram sample	Standard Deviation
A	0.016	0.010	0.0054
B	0.087	0.093	0.003
C	0.246	0.277	0.014

Standard Nitrite Concentration = 0.156 mg nitrite per gram cured meat.

The results showed that the chorizo from manufacturers A and B have nitrite concentration below the level set by the Meat Inspection Regulations. Chorizos from manufacturer A have a very small amount of nitrite compared to the maximum nitrite level while chorizos from

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manufacturer B have nitrite level close to the standard level for both the raw and cooked samples. On the other hand, manufacturer C chorizos have nitrite level beyond the maximum level.

The result shown in Tables 2 and 3 implies that chorizos from manufacturers A and B are safe in terms of the potential risks that the nitrite may pose to human health. Exposure of human towards this amount of nitrite is considered insignificant because its benefits such as preventing development of botulinal toxin and inhibiting the production of malonaldehyde outweigh the potential risks. On the other hand, the results for manufacturer C shows a high level of nitrite compared with the set standard even after cooking. The amount of nitrite present in chorizo from manufacturers C is 168% higher from the standard level when it is raw and 78% higher from the standard level when it was cooked. This means that consumers of chorizo from the said manufacturer are at risks of the effects of nitrites.

Significant Difference of Chorizo's Nitrite Concentration to the Standard Concentration.

Table 4 shows the T-test result of raw and cooked Chorizo sample in comparison with standard Nitrite level.

Table 4
T-test Result for Raw and Cooked Chorizo Sample
in Comparison With Standard Nitrite Level

Sample	Raw		Cooked	
	t critical	t value	t critical	t value
A	1.8886	-123	1.638	-54
B	1.638	-4.44	1.638	-42
C	1.638	47.64	1.638	17.3

$\propto = 0.10$

The t–test results exemplified in Table 4 for raw and cooked chorizo showed that the test statistics for sample A and B were not in

the critical region. This means that the nitrite concentration of chorizo samples A and B contains nitrite not more than standard concentration. On the other hand, the t-test results for sample C showed that the test statistics fall in the critical region. This implies that the sample C contains a significant amount of nitrite exceeding the required standard concentration.

From the result, it can be inferred that chorizo samples A and B pose a little risk of getting nitrosamine while sample C poses a greater risk of getting nitrosamine which is a potential carcinogen.

Nitrite Concentration between the Raw and Cooked Chorizo

Table 5 summarizes the results for the analysis of nitrite for raw and cooked chorizo and shows the difference and percent reduction of nitrite concentration between the two conditions.

Table 5
Percent Reduction of Nitrite Concentration in Chorizo

Sample	mg nitrite per gram sample		Difference in nitrite content	Percent Reduction
	Raw	Cooked		
A	0.021	0.010	0.011	52.38
B	0.136	0.090	0.043	31.62
C	0.418	0.277	0.141	33.73

The result shows that the nitrite concentration of the three samples decreased when cooked. The nitrite concentration of the samples decreases at the range between 32 to 52 percent after cooking. Sample A has the largest decrease in nitrite concentration while sample B has the lowest decrease of nitrite concentration among the three samples. Cooking of cured meat decreases nitrite level which implies that some nitrite content might be converted to some other compounds which might be safe or hazardous.

Nitrite in Hotdog

Nitrite in Raw and Cooked Hotdog.

Tables 6 and 7 show the average concentration of nitrite in milligram per gram sample. The concentration of nitrite in the solution was determined using the Standard Calibration Curve.

Table 6
Average Nitrite Concentration of Raw
Hotdog for Four Trials

Sample	Absorbance	mg nitrite per gram sample	Standard Deviation
A	0.102	0.109	0.007
B	0.096	0.102	0.013
C	0.081	0.086	0.008

Standard nitrite concentration = 0.156 mg nitrite per gram cured meat

Table 7
Average Nitrite Concentration of Cooked
Hotdog for Four Trials

Sample	Absorbance	mg nitrite per gram sample	Standard Deviation
A	0.094	0.101	0.007
B	0.097	0.104	0.013
C	0.057	0.058	0.008

The results show that the nitrite contents of three hotdog samples are below the standard level of nitrite set by the Meat Inspection Regulations. Such result readily implies that eating hotdogs from the three manufacturers is considered safe because known benefits outweigh potential risks.

Significant Difference of Hotdog Nitrite Concentration to the Standard Concentration.

Table 8 shows the T-test for the raw and cooked hotdog samples in comparison with standard nitrite level

Table 8
T–test Result for the Raw and Cooked Hotdog
Samples in Comparison With Standard Nitrite Level

Sample	Raw		Cooked	
	t critical	t value	t critical	t value
A	1.638	-13.43	1.638	-15.71
B	1.638	-8.31	1.638	-26.00
C	1.638	-17.95	1.638	-103.2

$\propto = 0.10$

The t-test result shown in Table 8 for raw and cooked hotdog indicated that the three samples were not in the critical region. This means that the three samples contain nitrite lesser than the standard concentration. From the results, it can be deduced that the hotdog samples posed a little risks of getting nitrosamine which is a potential carcinogen.

Nitrite Concentration between the Raw and Cooked Hotdog.

Table 9 presents the percent reduction of Nitrite Concentration in Hotdog.

Table 9
Percent Reduction of Nitrite
Concentration in Hotdog

Sample	mg nitrite per gram sample		Difference in nitrite content	Percent Reduction
	Raw	Cooked		
A	0.109	0.101	0.008	7.339
B	0.102	0.104	-0.002	-1.961
C	0.086	0.058	0.028	32.56

Based from the Table above the nitrite concentration of the hotdog samples except sample B decreased at the range between 7 to 30 percent after cooking. In the case of sample B, an increase was observed after cooking. Cooking of cured meat decreases nitrite level which implies that some nitrite content might be converted to some other compound which might be safe or hazardous.

Significant Difference of Nitrite Concentration among Three Samples of Chorizo and Hotdog

Table 10 shows the analysis of Variance for three samples of Chorizo and Hotdog.

Table 10
Analysis of Variance for Three Samples
of Chorizo and Hotdog

Cured Meat Products	Raw		Cooked	
	F critical	F computed	F critical	F computed
Chorizo	4.4590	2044.00	3.2906	3573.00
Hotdog	3.2906	29.80	3.2906	16.50

The Table above implies that three samples of chorizo and hotdog differ significantly on their nitrite content.

4. Summary of findings, Conclusion and Recommendations

This study was conducted to determine the level of nitrite in chorizos and hotdogs sold in Ozamiz Public Market using a descriptive approach. The colorimetric method of analysis was used in the collection of data. The results were compared with the standard nitrite level set by the Meat Inspection Regulations.

Summary of Findings

The obtained data generated the following findings:

Nitrite in Chorizo. The chorizo sample C exhibited a high nitrite concentration that exceeded the standard level for both the raw and cooked samples. Chorizo samples A and B had nitrite concentration within the standard nitrite level of 0.156 mg per gram cured meat. As such, the findings divulge that the amount of nitrite present in chorizo sample C is 168% higher from the standard level when raw and 78% higher from the standard level when cooked.

Furthermore, the t-test results manifested that chorizo samples A and B contained nitrite not more than the standard concentration while sample C contained a significant amount of nitrite more than the standard concentration. In like manner, the findings also displayed that the nitrite level of chorizo decreased when cooked.

Nitrite in Hotdog. The three hotdogs samples exhibited a low nitrite concentration below the standard level for both the raw and cooked samples. This finding was confirmed by the t-test. The result shows that the three hotdog samples contained nitrite not more than the standard concentration. In addition, the findings also revealed that the nitrite level of hotdog decreased when cooked except sample B.

Conclusions

The study confirms that among the three manufacturers of chorizo, manufacturer C poses greater risks in terms of its effect on human health due to its high nitrite concentration which exceeds the tolerable limit. Consuming chorizos from manufacturer C may increase N-nitrosation which incessantly lead to cancer.

On the other hand, the study also confirms that hotdog samples are considered safe because their nitrite concentrations are within the tolerable limit. This means that eating of hotdog from the three manufacturers cannot harm the human health.

More pervasively, the nitrite concentration of most samples decreases after cooking. This implies that cooking converts the nitrite into a new substance.

Recommendations

On the basis of the findings and conclusions made in this study, the following recommendations are offered:

1. A recipe check should be done by the Bureau of Food and Drugs (BFAD) before issuing license to local manufacturers of preserved foods to ensure that the nitrite level will not exceed with the standard tolerable concentration after processing.
2. Consumers should be informed on the risks and beneficial effects of nitrite present in cured meat. In this way, consumers may become vigilant in choosing and in buying the product.
3. Manufacturers should be well-informed about the good and bad effects of nitrite and be educated on its proper use in curing meat. Thus, they should be legally registered in the BFAD to assure that they follow the procedures and guidelines set by the government concerned.
4. Hotdogs from manufacturer B should be further investigated to verify the increase of nitrite after cooking.
5. Chorizo products of manufacturer C should be subjected to a more comprehensive study by BFAD or any concerned individuals to verify further the nitrite concentration present in the product.
6. In marketing the cured meat products, the following should be indicated:
    a. name and address of the manufacturer
    b. date manufactured
    c. expiration date
    d. additives added including nitrite and
    e. the amount of additives added
7. Analysis must be conducted daily for one stock sample within one week to monitor changes of nitrite concentration in relation to length of storage.

8. Analysis must be done in an environment where there are no nitrogen oxides in air to eliminate or at least minimize its possibility of getting absorbed by the sample.
9. A more thorough and comprehensive investigation must be conducted in all public markets within the city for nitrite determination in cured meats.

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Grade Six Mathematics Performance: Suggested Enrichment Activities

Maria Nancy Quinco-Cadosales, PhD
Benito Dumaog
Integrated School

Abstract

The levels of Mathematics performance of the Grade 6 pupils in La Salle University, Integrated School for school year 2006-2007 was described and analyzed employing the descriptive type of research. The standardized Mathematics Diagnostic Test by the Center for Educational Measurement, Inc. (CEM) was used to measure the Grade 6 pupils' Mathematics performance in the following content areas: number theory, fractions, decimals, ratio, proportion and percent, geometry and measurement, statistics, and algebra. Furthermore, it also measured the pupils' cognitive skills like: knowledge, computation, comprehension, and application. As found in the study, the Grade 6 pupils were performing well in algebra, number theory, decimals, ratio, proportion and percent while they need more enrichment activities in fractions, geometry and measurement, and statistics as shown in their low performance in these content areas. The Grade 6 pupils had developed their cognitive skills in Mathematics like knowledge, computation, and comprehension. On the other hand, they need to enhance their cognitive skill in application. In general, the study showed that the Grade 6 pupils had below average performance in Mathematics. A number of the Grade 6 pupils had not mastered some the competencies in Mathematics. Based on the findings of the study, enrichment activities on the areas in Mathematics' content that the pupils had low performance were suggested with the emphasis in application.

1. Introduction

Mathematics is one of the most potent tools in the development and advancement of science and technology. It is very useful in almost all fields like physical and social sciences, medicine, psychology, humanities, economics and even the arts. Because of the importance of Mathematics, every student should learn the subject and be able to relate the knowledge that he gains in his daily life situations (Suana, 2002).

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Mathematics aims to demonstrate understanding and skills in computing accurately, estimating, communicating, think analytically and critically, and in solving problems in daily life using appropriate technology (BEC:2002). The Primer of the 2002 Basic Education Curriculum emphasized that the grade six pupils at the end of the school year would be able to master the concepts and operations of whole numbers; demonstrate understanding of concepts and perform skills on decimals, fractions, geometry, measurement, and graphs; integers; exact and estimated computation of the four fundamental operations involving decimals, money, fractions and measurement; and apply the concepts of problem solving.

This motivated the researchers to look closely on the Mathematics performance of the Grade Six pupils.

The Problem

The purpose of this study was to assess the Mathematics performance of the Grade VI pupils in La Salle University, Integrated School for School Year 2006-2007. This study sought to: describe the levels of the pupils' Mathematics performance and suggest Mathematics' enrichment activities.

2. Methodology

This study involved the 89 Grade Six pupils of La Salle University who were enrolled in School Year 2006 – 2007. The study employed the descriptive research to describe the levels of the Grade Six pupils' Mathematics performance.

The instrument used to measure the Grade Six pupils' Mathematics performance was a standardized test on Mathematics Diagnostic Test for Grade Six. This was administered by the Center for Educational Measurement, Inc. (CEM).

3. Results and Discussion

The Grade 6 Mathematics Diagnostic Test included the following content areas: number theory; fractions; decimals; ratio, proportion, and percent; geometry, and measurement; statistics; and algebra. It also measured the following cognitive skills: knowledge; comprehension; computation; and application.

The test specifications as provided by the Center for Educational Measurement, Inc. (CEM) is shown in Figure 1.

Figure 1. Test Specifications
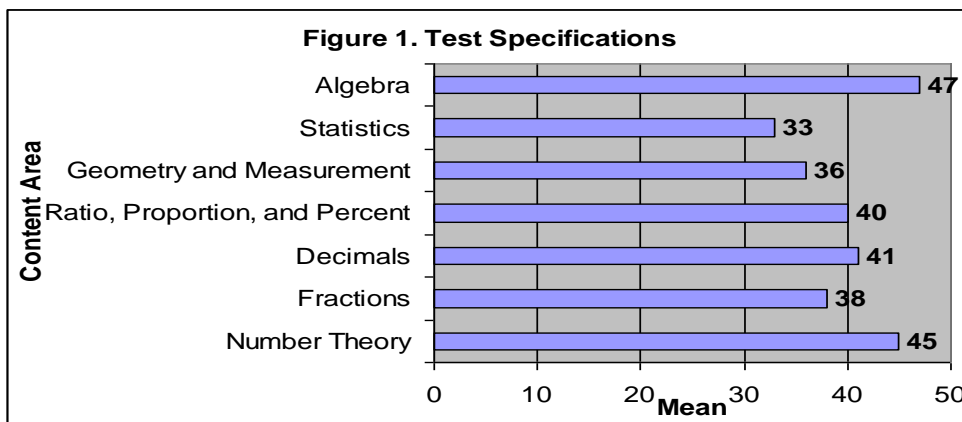
The data suggest that the Grade Six pupils were performing well in Algebra, Number Theory, Decimals, Ratio, Proportion and Percent. This means that they had enough knowledge and skills in the Mathematics content areas mentioned above. While, there are also Mathematics content areas that the Grade Six pupils needed to enhance more like: Fractions, Geometry and Measurement, and Statistics.

Moreover, there are also some cognitive skills being measured in this diagnostic test such as knowledge, comprehension, computation and application. Figure 2 shows the cognitive skills of the Grade Six pupils in Mathematics.

Figure 2. Cognitive Skills of the Grade Six Pupils in Mathematics
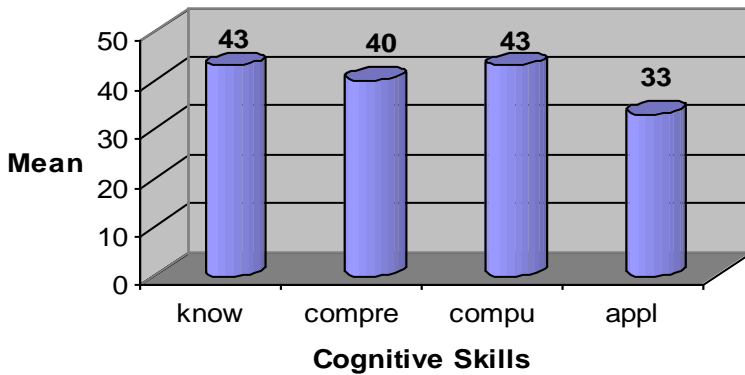
As displayed in the Figure, the Grade Six pupils had developed their cognitive skills in Mathematics like knowledge, computation and comprehension. While, they need more Mathematics enrichment activities that will enhance their cognitive skill on application.

Table 1 below displays the overall performance of the Grade Six pupils in Mathematics.

Table 1
Mathematics Performance of the Grade Six Pupils

Range	Verbal Description	Frequency	Percent
670 - 800	Excellent	1	1
621 - 669	Superior	2	2
573 - 620	Above Average	7	8
525 - 572	High Average	10	11

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474 – 524	Average	21	24
425 - 473	Low Average	13	15
375 - 424	Below Average	23	26
319 - 374	Poor	9	10
200 - 318	Very Poor	3	3
	TOTAL	**89**	100

As depicted in the Table above, 26% of the Grade Six pupils had **below average** performance in Mathematics. This data show that a number of Grade Six pupils had not mastered some of the competencies in Mathematics. As shown in Table 1, there are content areas that these pupils showed low performance. A majority of the Grade Six Pupils have **low average** to **very poor** performance in Mathematics compared to those who are performing from average to above average.

Based on the findings presented in Figures 1 and 2 and Table 1 are suggested Mathematics Enrichment Activities. These enrichment activities will be proposed to be the introductory activities in Grade 7. The suggested enrichment activities below were based on the areas in Mathematics' content that the pupils had low performance. The content areas included in the enrichment activities were on fractions, geometry and measurement, and statistics. Application is given emphasis in the suggested enrichment activities since it is in this cognitive skill that pupils have low performance.

A. FRACTIONS

CONTENT	OBJECTIVES	ACTIVITIES	APPLICATION
Least Common Denominator (LCD) Equivalent Fractions Operations of Similar and Dissimilar Fractions and Mixed Numbers *Source: Villamor and Wright (2001)*	Review or reteach the past lessons for enrichment and further development of skills in: a. Least Common Denominator (LCD) b. Equivalent Fractions c. Operations of Similar and Dissimilar Fractions and Mixed Numbers	1. <u>Remediation</u> Discuss the lessons again using the same method. Give more examples on how to find the LCD of given dissimilar fractions; how to add, subtract, multiply, and divide similar and dissimilar fractions and mixed numbers. 2. <u>Reinforcement</u> Pupils should avail all possible sources of related exercises on the topics like teacher-made exercises and exercises (classwork,	Pupils make use of the following activities for enhancement and further development of skills: 1. Worksheet 2. Teacher-made Test 3. Drill Cards and Charts 4. Number Game Contests 5. Word Problem Solving 6. Solving of Word/ Number Puzzles

| | | practice, and enrichment) in their textbook

3.   <u>Enrich ment</u>
Have the pupils answer teacher-made problems and problems in their textbook as practice exercises or homework | |

B. GEOMETRY AND MEASUREMENT

CONTENT	OBJECTIVES	ACTIVITIES	APPLICATION
Perimeter/ Circumference and Area of Plane Figures Surface Area and Volume of Solid Figures *Source: Villamor*	Discuss again or reteach the past lessons for further development of the skills in: a. finding the perimeter/ circumference and are of plane	1. <u>Remediation</u> Reteach the lessons again using the same method. Give more examples on how to determine the perimeter/ circumference and area of plane figures. Examples on area and volume of solid figures. 2. <u>Reinforceme</u>	Pupils make use of the following activities for enhancement and development of skills: 1. Teacher-made Test 2. Workshe et 3. Drill Cards and Charts 4. Number

| | | figures
b. solve for the surface area and volume of solid figures | nt
Pupils should perform exercises on the topics given by the teacher and exercises in their textbook as practice exercises

3.   Enrichment
Have the pupils answer the teacher-made problems and problems in their textbook as exercises and homework | Game Contests
5.   Word Problem Solving
6.   Solving of Word/ Number Puzzles |

and Wright (2001) appears in the first column at the top.

C. STATISTICS

CONTENT	OBJECTIVES	ACTIVITIES	APPLICATION
Finding the Mean, Median, and Mode *Source:* *Reston* *(2004)*	Review and reteach the past lessons for enhancement and further development of skills in finding the mean, median, and mode	1. Remediation Reteach the lessons on how to find the mean, median, and mode using the same method. Pupils are given more examples on the topics 2. Reinforcement Pupils are made to avail exercises	Pupils make use of the following for enhancement and further development of skills: 1. Teacher-made Test 2. Drill Cards and Charts 3. Number Game Contests

		prepared by the teacher and exercises in their textbook (classwork, practice, and enrichment) as practice exercises 3. <u>Enrichment</u> Have the pupils answer the teacher-made exercise problems and problems in their textbook	4. Word Problem Solving 5.Solving of Word and Number Puzzles

4. Summary, Conclusions and Recommendation

Summary of Findings

1. The Grade Six pupils were performing low in the following Mathematics content: fractions, geometry and measurement, and statistics.
2. There were four Mathematics cognitive skills measured in the Mathematics Diagnostic Test. It was noted that the Grade Six pupils were performing low in application skill.
3. The majority of the Grade Six pupils' overall performance in Mathematics ranged from low average to very poor.

Conclusion

1. The Grade Six pupils were performing well in algebra, number theory, decimals and ratio, proportion and percent. While on fractions, geometry and measurement, and statistics, they were performing low.
2. They had developed the following cognitive skills: knowledge, computation, and comprehension. While, they

need to engage more in Mathematics activities that will develop their application skill.

3. The overall performance of the Grade Six pupils in Mathematics ranged from low average to very poor.

Recommendations

1. There are content areas in Mathematics that have to be developed more among the pupils. The suggested Mathematics enrichment activities will be the introductory lesson in Grade 7 with more emphasis on application skill.

2. The curriculum pacing guide in Mathematics for Grade Six will be revised based on the findings of this study.

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An Assessment on the Procedural Skills of Primary Health Care 1 Students: An Intervention Program

Arlene D. Apao
College of Nursing

Abstract

This descriptive type of research study aimed to assess the procedural skills of BSN – II students of La Salle University. There were 130 respondents. All were second year nursing students enrolled in primary health care laboratory during the 1st semester school year 2006-2007. It was found out that the students' performance in all nursing procedures is satisfactory.

1. Introduction

Nursing is an emerging profession and discipline. It is a practice that applies knowledge through specialized skills, upholds standards developed by and for the profession, develops theories and conducts research, and uses the nursing process to give individualized and holistic care (Taylor, C. et. al 2001).

The ability to perform nursing procedures with skill and confidence is the essence of nursing care (Springhouse, 2002). Whether a nursing student or an experienced nurse, one needs a clear, reliable, up-to-date information to perform procedures safely and accurately.

Palad(2004) asserted that learning these procedures equip the students with competencies in the care/ management of clients in different health settings. Moreover, it is designed to enhance their knowledge and attitude toward an efficient and effective delivery of nursing service (Palad 2004).

The BSN program of La Salle University is designed to prepare students as self-directed general nurse practitioners equipped with the knowledge, attitudes, and skills acquired to help individuals, families,

and communities cope with current and potential threats to health. It also facilitates the development of the students to enable them to acquire broad knowledge and skills based on the concepts of holistic health theories and practices designed to promote health, harmony and well-being. At the end of Level II, the students should have acquired beginning skills in the use of nursing process as a basis of health care delivery, skills in comprehensive developmental approach in the care of normal individuals and the families (LSU College of Nursing Student's Handbook).

The College of Nursing aims to produce a competent Lasallian graduate, a critical, creative thinker and skillful nurse, world class, globally competitive and excellent in communication skills. Since the second year students will be exposed to hospital duty the succeeding semesters, there is a need to assess the procedural skills of the primary health care students. The performance of the BSN-II students in their nursing procedures performed during the first semester will help assess their skills in caring patients in the future. Assessing the student's strengths and weaknesses in each procedure will enable the researchers to make necessary interventions to further improve their skills; thus, making the students globally competitive and competent nurses in the future.

Review of Related Literature

Assessment is an interactive process of information gathering and analysis that nurses carry out to identify client strengths and actual and potential health problems and to evaluate effectiveness of care (Krozier, B. et. al 2004). A comprehensive assessment includes data about a clients' psychosocial, spiritual, cultural, environmental, and developmental status as well as physiologic health. Nurses also regularly perform focused assessments as indicated by clients' needs.

The most frequent measurement obtained by health practitioners are those of temperature, pulse, blood pressure, and respiratory rate. As indicators of health status, these measures indicate the effectiveness of circulatory, respiratory, neural, and endocrine body functions. Because

of their importance they are referred to as vital signs. Many factors, such as the temperature of the environment, the client's physical exertion, and the effects of illness, cause vital signs to change, sometimes outside an acceptable range. Measurement of vital signs provides data to determine clients' usual state of health (baseline data) and response to physical and psychological stress and medical and nursing therapy. A change in vital signs can indicate a change in physiological function. As Potter et. al (2004) has stated an alteration in vital signs may signal the need for medical or nursing intervention.

Vital signs are a quick and efficient way of monitoring a clients' condition or identifying problems and evaluating the clients' response to intervention. Assessment of vital signs allows the nurse to identify nursing diagnoses, to implement planned interventions, and to evaluate success when vital signs have returned to acceptable values. When the nurse learns the physiological variables influencing vital signs and recognizes the relationship of vital signs changes to other physical assessment findings, precise determinations of the clients' health problems can be made (Potter, et.al. 2004). Vital sign assessment is an essential ingredient when nurses and physician collaborate to determine the client's health status. Careful measurement techniques ensure accurate findings.

Hand washing is important in every setting, including hospitals. It is considered one of the most effective infection control measures. Any client may harbor microorganisms that are currently harmless to the client yet potentially harmful to another person or the same client if they find a portal of entry (Kozier, B. et.al 2004). It is important that both the nurses' and clients' hands be washed at the following times to prevent the spread of microorganisms: before eating, after using the bedpan or toilet, and after the hands have come in contact with any body substances, such as sputum, drainage from a wound. Health care workers should wash their hands before and after giving care of any kind. Positioning a client in good body alignment and changing the position regularly and systematically are essential aspects of nursing practice (Kozier, B.et.al 2004). Clients who can move easily automatically reposition themselves for comfort. Such people generally

require minimal positioning assistance from nurses, other than guidance about ways to maintain body alignment and to exercise their joints. For all clients, it is important to assess the skin and provide skin care before and after a position change.

Any position, correct or incorrect, can be detrimental if maintained for a prolonged period (Kozier, B.et.al 2004). Frequent change of position helps to prevent muscle discomfort, undue pressure resulting in pressure ulcers, damage to superficial nerves and blood vessels, and contractures. Position changes also maintain muscle tone and stimulate postural reflexes. When a client is not able to move independently or assist with moving, the preferred method is to have two or more people move or turn the client. Appropriate assistance reduces the risk of muscle strain and body injury to both the client and nurse. Although healthy people usually take for granted that they can change body position and go from one place to another with little effort, ill people may have difficulty moving, even in bed. How much assistance clients require depends on their own ability to move and their health status (Kozier,B.et.al 2004). Nurses should be sensitive to both the need of people to function independently and their need for assistance to move.

Heat and cold are used for a wide variety of therapeutic purposes that are an essential part of planning individualized care and from the basis for patient outcomes (Taylor, 2001). When applications of heat or cold are part of a plan of care, the patient should be able to achieve the following: 1.) verbalization of increase comfort, as evidence by decrease muscle spasms, increase ability to rest, decrease local inflammation, and decrease edema, 2.) have evidence of wound healing, and 3.) verbalization and demonstration of safe hot or cold application (Taylor 2001).

Figure 1 shows the schematic diagram of the study.

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                    ┌──────────────────────────┐
                    │     PROCEDURAL SKILLS     │
                    └──────────────────────────┘
                                  │
    ┌──────────┬──────────┬───────┴────────┬──────────────┬──────────┐
┌─────────┐┌─────────┐┌──────────────┐┌──────────────┐┌──────────┐
│  Hand   ││  Vital  ││  Positioning ││   Moving     ││ Hot and  │
│ Washing ││  Signs  ││              ││  and Lifting ││   Cold   │
└─────────┘└─────────┘└──────────────┘└──────────────┘└──────────┘
    │          │              │              │            │
    └──────────┴──────┬───────┴──────────────┴────────────┘
                      │
          ┌───────────────────────────┐
          │   An Intervention Program │
          └───────────────────────────┘
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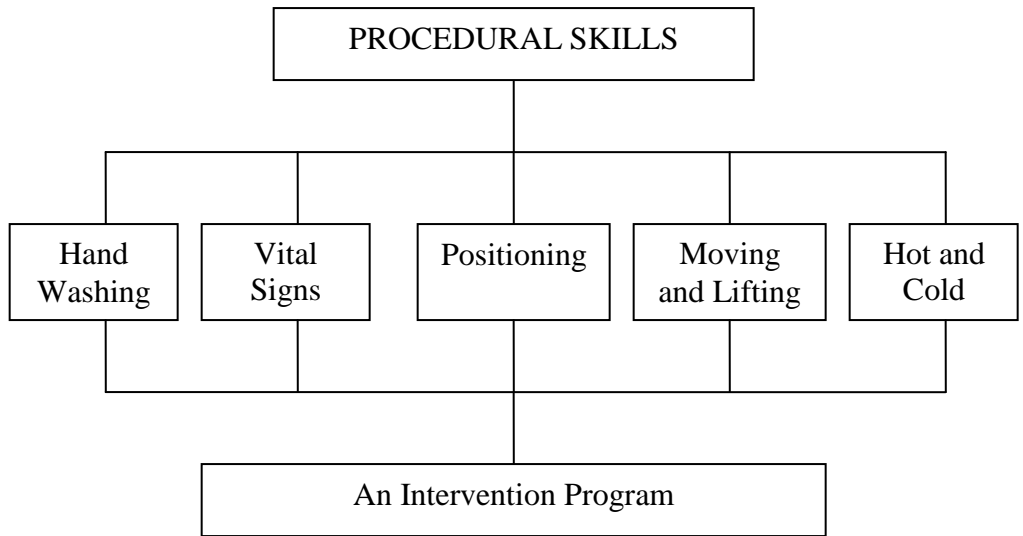
Figure 1. Schematic Diagram of the Study

The study focused on the procedural skills of BSN –II students. These procedures are hand washing, Vital signs taking, positioning of patient, moving and lifting of patient and hot and cold application. An intervention program was implemented based on the findings of the study.

Statement of the Problem

This study aimed to assess the procedural skills of BSN – II students of La Salle University. Specifically, this research sought answers to the following questions:

1. What is the profile of the health care nursing students in terms of the following nursing procedures:
    a. Hand washing
    b. Vital Signs
    c. Positioning of Patient
    d. Moving and Lifting of Patient
    e. Hot and Cold Application

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2.   What are the nursing students' strengths and weaknesses in each nursing procedure?
3.   What intervention program may be designed based on the results of the study?

2. Methodology

This study was a descriptive type of research involving 130 respondents. All were second year nursing students enrolled in primary health care laboratory during the 1st semester school year 2006-2007. This study used purposive sampling to have a 100 percent evaluation on the students' skills in performing the nursing care procedures.

This research utilized the standardized performance checklist of the students' nursing manual procedures of La Salle University – Ozamiz, College of Nursing.

Scores were gathered from the performance checklist of all students on the following procedures: hand washing, vital signs, positioning of patient, moving and lifting of patient, and hot and cold application. A student got a score of 2 if he or she performed the step correctly and a score of 1 if he or she has done it incorrectly or not at all.

Scores	Interpretation
2	Satisfactory (S)
1	Unsatisfactory (US)

3. Results and Discussion

This section presents, analyzes and interprets the data gathered. The presentation is organized according to the following students' performance in nursing procedures: handwashing, vital signs, positioning of patient, moving and lifting of patient, and hot and cold application.

Table 1 shows the students' performance in handwashing.

Table 1
Students' Performance in Handwashing

STEPS	S	Percent	US	Percent
1.Roll your sleeves above your elbows and remove your watch. If your watch has an expansion band,you may simply move it up above your elbow.	125	96	5	4
2.Turn on the water and adjust the temperature (if adjustment is available). A deep sink with controls that can be operated by the foot, leg, or elbow is ideal.	116	89	14	11
3.Dispose liquid or powdered soap. Bar soap is not recommended. If only bar soap is available, lather and rinse the bar thoroughly.	129	99	1	1
4.Lather your hands and arms well.	109	84	21	16
5.Clean your fingernails as needed with a nail file or orange stick. (If these items are not available, do this before you leave home.)	113	87	17	13
6.Wash your hands and arms up to your elbows, adding soap as needed. Keep your hands lower than your elbows at all times. a. Rub briskly, using friction and a rotary motion (as opposed to a back and fourth motion.) b. Pay particular attention to the areas between your fingers, your knuckles, and the outside surfaces to the fifth or	63	48	67	52

"little" fingers.				
7.Holding your hands and forearms lower than your elbows, rinse thoroughly, starting at one elbow and moving down the arm. Then, repeat this step for the other arm.	114	88	16	12
8.Dry your hands thoroughly with a hand towel, blotting it and not rubbing it.	119	92	11	8
9.Use a dry hand towel to turn off the faucet if it is hand operated.	127	98	3	2
10.Use lotion if needed. In some settings, lotion is not allowed.	130	100	0	0

Table 1 shows that steps 3 and 10 were performed correctly while steps 6 was either performed incorrectly or not at all. This implies that many students forgot to perform the clean technique in hand washing in preventing the transfer of microorganisms.

Table 2 shows the students' performance in oral temperature taking.

Table 2
Students' Performance in Oral Temperature Taking

STEPS	S	Percent	US	Percent
1. Wash your hands.	127	98	3	2
2. Rinse thermometer in cold water if kept in a chemical solution and wipe dry with wipes using a firm twisting motion from mercury bulb to top.	92	71	38	29
3. Grasp the thermometer with thumb and forefinger and shake vigorously by flicking, wrist in downward motion to lower mercury level below 35 ºC.	111	85	19	15
4. Identify the patient and place him	128	98	2	2

in a comfortable position. Usually in a supine position.				
5. Explain procedure to patient.	130	100	0	0
6. Place thermometer in patient's mouth under tongue and ask patient to hold lips closed.	126	97	4	3
7. Leave in place 3 to 5 minutes.	130	100	0	0
8. Instruct patient not to bite the thermometer and close his lips gently; breathe through the nose.	109	84	21	16
9. Place patient's wrist across the chest and feel the radial pulse using 3 middle fingers. Count pulse for one whole minute.	129	99	1	1
10.Still in the same position, continue to count respiration by watching & feeling respiratory movements of chest/abdomen.	129	99	1	1
11.Remove thermometer from mouth. Wipe dry using the same twisting motion from top to thermometer bulb.	117	90	13	10
12.Hold thermometer at eye level and look for the column of mercury between the lines and figures and note where it stopped.	124	95	3	5
13.It maybe necessary to roll the Thermometer slowly back and forth to visualize the mercury.	110	85	20	15

As shown in the Table, steps 5 and 7 in oral temperature taking were perfectly done by the students. Some of the students got unsatisfactory rating on steps 2, 3, 8 and 13. This means that some students had difficulty or forgot to perform these steps.

The students' performance in axillary temperature taking is shown in Table 3.

Table 3
Students' Performance in Axillary Temperature Taking

STEPS	S	Percent	US	Percent
1. Follow steps 1-5 of taking oral temperature.	126	97	4	3
2. Assist patient to a comfortable position and expose axilla. Pat axilla dry of perspiration.	115	88	15	12
3. Place thermometer in axilla and lower patient's arm down across the chest.	128	98	2	2
4. Leave in place 8 to 10 minutes	128	98	2	2
5. Take pulse and respiration for one full minute each.	130	100	0	0
6. Remove thermometer and wipe it with wipes from fingers down to bulb. Discard wipes.	126	97	4	3
7. Read temperature by rotating thermometer until the mercury level is clearly visible, shake down, and replace in bedside container.	118	91	12	9

The Table shows that step 5 was perfectly done by the students. Few students got unsatisfactory rating on steps 1,3,4 and 6; some forgot to perform the steps like exposing the axilla and patting it dry. Students need to be reminded that wet axilla alters the reading of the patient's temperature.

The students' performance in rectal temperature taking is shown in Table 4.

Table 4
Students' Performance in Rectal Temperature Taking

STEPS	S	Percent	US	Percent
1. Steps 1-5, same as with oral temperature.	129	99	1	1
2. Provide privacy. Instruct and assist patient to turn on side facing away from you with knees slightly flexed.	125	96	5	4
3. Wipe dry thermometer.	126	97	4	3
4. Lubricate tip of thermometer with lubricant on paper tissue.	122	94	8	6
5. Fold back bed linen to expose patient's buttocks.	129	99	1	1
6. Separate buttocks with one hand so anal sphincter opening is visible.	129	99	1	1
7. Insert thermometer into rectum approximately 1/2 to 1-1/2 inches depending on the age of the patient.	128	98	2	2
8. Leave in place for 3 to 5 minutes	129	99	1	1
9. Count pulse & respirations.	130	100	0	0
10. Remove thermometer by rotating the thermometer.	127	98	3	2
11. Read thermometer by rotating Thermometer until the mercury level is clearly visible. Shake thermometer down.	117	90	13	10
12. Assist patient to a comfortable position.	111	85	19	15

The Table depicts that students sometimes forgot to assist the patient to a comfortable position after the rectal temperature taking. A nurse should always remember to provide comfort to patients after every procedure.

Table 5 presents the students' performance in radial pulse taking.

Table 5
Students' Performance in Radial Pulse Taking

STEPS	S	Percent	US	Percent
1. Wash your hands.	126	97	4	3
2.Place patient in comfortable position.	128	98	2	2
3. Ask about activity level within the last hour.	86	66	44	34
4. Palpate arteries by using pad of the middle three fingers of your hand. a. Radial artery is usually used as it lies just under the skin of the inner surface of the wrist directly over the radius. b. Press the artery against the bone or underlying firm surface to occlude vessel & then gradually release pressure.	126	97	4	3
5. If rhythm is regular, count pulse for 30 seconds and multiply by two to obtain pulse rate.	118	91	12	9
6. If rhythm is irregular, take an apical pulse for at least one minute or longer if difficult to count.	122	94	8	6
7. Check to see that patient is comfortable.	129	99	1	1
8. Wash your hands.	129	99	1	1

As shown in Table 5, students sometimes forgot to ask the activity level of the patient within the last hour. This step needed to be checked because it alters the reading of the pulse rate.

Table 6 shows the students' performance in apical radial pulse taking.

Table 6
Students' Performance in Apical Radial Pulse Taking

STEPS	S	Percent	US	Percent
1. Gather equipment.	129	99	1	1
2. Wash your hands.	130	100	0	0
3. Identify patient by check identity band.	125	96	5	4
4. Explain the procedure to the patient especially if two nurses are taking pulse.	120	92	10	8
5. Expose area as necessary.	114	88	16	12
6. Locate the radial pulse. The second nurse locates the apical pulse, fifth intercostals space midclavicular line and place the stethoscope. This can be done by placing the middle fingers just below the left nipple within the 5th intercostal space, about 3 inches from the midline.	123	95	7	5
7. One nurse gives signal when to begin count.	120	92	10	8
8. Each nurse should count the apical-radial pulse for one full minute.	109	84	21	16
9. Position the patient for comfort.	118	91	12	9
10. Wash your hands.	117	90	13	10
11. Subtract the pulse rate from the apical rate to obtain the pulse deficit.	103	79	27	21

The Table shows that apical-radial pulse was satisfactorily done but steps 8 and 11 need to be checked. The counting of apical radial pulse for one full minute was necessary to have an accurate result and how to obtain the pulse deficit.

Table 7 shows students' performance in taking respiration.

Table 7
Students' Performance in Taking Respiration

STEPS	S	Percent	US	Percent
1. Wash your hands.	129	99	1	1
2. Explain procedure to the patient.	129	99	1	1
3. Check lighting.	102	78	28	22
4. Maintain patient's privacy.	129	99	1	1
5. Place hand on chest or observe chest rise and fall and count respirations.	117	90	13	10
6. Count respiration for one minute.	124	95	6	5
7. Observe respiratory pattern and depth of respirations.	101	78	29	22
8. Wash your hands.	129	99	1	1
9. Compare respiratory rate with previous readings.	92	71	38	29

The Table shows that many students got unsatisfactory rating in steps 3, 7, and 9. They forgot to check the lighting, observe the respiratory pattern and depth of respiration, and compare the respiratory rate with the previous reading. They usually focused on getting respiration in one full minute and skipped doing some of these steps. Following the steps can make them fully assess the respiratory condition of the patients.

The students' performance in taking blood pressure is shown in Table 8.

Table 8
Students' Performance in Taking
Blood Pressure

STEPS	S	Percent	US	Percent
1. Bring equipment to bedside and explain the procedure to patient.	129	99	1	1
2. Let patient assume a comfortable	114	88	16	12

position either lying or sitting with the forearm at the level of the heart & palm of the hand upward.				
3. Roll sleeve about 5 inches above elbow.	123	95	7	5
4. Check the sleeve, do not obstruct.	116	89	14	11
5. Place manometer at eye level	120	92	10	8
6. Place cuff of sphygmomanometer at the bend of the arm using 3 middle fingers.	112	86	18	14
7. Locate brachial pulse in inner aspect at the bend of the arm using 3 middle fingers.	116	89	14	11
8. Close valve and inflate cuff with the right hand at the same time feeling the brachial pulse in the left until it ceases.	107	82	23	18
9. Inflate cuff 30 mmHg. Higher.	82	63	48	37
10.Remove fingers and place stethoscope over point.	105	81	25	19
11.Open screw and deflate cuff slowly at the rate of 2-3 mmHg.	107	82	23	18
12.Read manometer at eye level within 3 feet.	124	95	6	5
13.Note the level of mercury when the first beat is heard – systolic pressure.	104	80	26	20
14.Continue to release air and note level of mercury when the beat is heard – diastolic.	103	79	27	21
15.Deflate remaining air completely.	106	82	24	18
16.Assist patient to a comfortable position and return apparatus neatly to its case.	116	89	14	11

As shown in Table 8 steps 9, 13, and 14 needed to be reinforced for reading the blood pressure. Some of the students failed to hear the diastole and systole and forgot to inflate the cuff about 30mmHg after

the cessation of the pulse rate. There were many students who had difficulty in taking the blood pressure which was a baseline data in assessing a patient.

Table 9 presents the students' performance in the preliminary procedure of positioning a patient.

Table 9
Students' Performance in the Preliminary
Procedure of Positioning a Patient

STEPS	S	Percent	US	Percent
1. Assess the patient's need to move.	106	82	24	18
2. Assess the patient's ability to move unaided.	111	85	19	15
3. Check on the assistive devices that are available.	128	98	2	2
4. Plan the moving technique.	100	77	30	23
5. Wash your hands.	130	100	0	0
6. Obtain any needed supportive devices or assistance.	130	100	0	0
7. Identify the patient.	118	91	12	9
8. Raise the bed to a high position.	129	99	1	1
9. Put the bed in the flat position, if possible.	129	99	1	1
10.Correctly position the patient.	127	98	3	2

The Table shows that some of the students sometimes missed planning a moving technique and assessing the patient's need to move unaided. Planning ahead reduces risk of further injury to the patient.

Table 10 shows the students' performance in supine position.

Table 10
Students' Performance in Supine Position

STEPS	S	Percent	US	Percent
1. The patient lies on her back, with the spine in straight alignment.	130	100	0	0
2. Place a low pillow under the head.	130	100	0	0
3. The arms may be at the patient's side with the hands pronated. The forearms can also be elevated on pillows.	119	92	11	8
4. If the patient's hands are paralyzed, hand-rolls should be placed in the palm of the patient's hand. Hand-rolls can be made of several wash cloths or other linen that have been rolled or taped. It should be large enough so that fingers and thumb are slightly flexed around it.	129	99	1	1
5. When the body is lying flat on the bed, place a trochanter roll on the legs. This roll is made from a sheet, bath towel, or pad. Place one end flat under to form a roll. An ankle roll, which is made in the same way but is smaller, can accomplish the same purpose.	112	86	18	14
6. The foot should be supported by a footboard, sandbags, or a strong cardboard carton so that the toes point upward in anatomical position and do not fall into plantar flexion.	125	96	5	4

The Table shows that almost all the students got satisfactory in supine position procedure. It was a well mastered procedure maybe because it was the usual position of patients in the hospital. Steps 1 and 2 were perfectly done.

The students' performance in side-lying position is shown in Table 11.

Table 11
Students' Performance in Side-lying Position

STEPS	S	Percent	US	Percent
1. The patient is on the side with the head supported on a low pillow.	129	99	1	1
2. Undertuck a pillow along the patient's back.	112	86	18	14
3. Bring the underlying arm forward and flex it onto the pillow used for the head.	127	98	3	2
4. Bring the top arm forward, flex it, & rest it on a pillow in front of the body. Put hand-rolls in place if needed.	121	93	9	7
5. The top leg should be flexed and brought slightly forward.	127	98	3	2
6. Place a pillow lengthwise under the top leg. The lower leg lies straight.	128	98	2	2
7. Place a pillow lengthwise under the top leg. The lower leg lies straight.	126	97	4	3

As shown in the Table, 6 steps were satisfactorily done by the students. However, step 2 which was under tucking a pillow along the patient's back needed to be enhanced to make the patients comfortable.

Table 12 shows the students' performance in prone position.

Table 12
Students' Performance in Prone Position

STEPS	S	Percent	US	Percent
1. Place patient on his abdomen, turn the head to one side. A small pillow or a folded towel maybe used under the head.	128	98	2	2

2. See to it that the spine is straight. Place a folded towel under each shoulder. Put a flat pillow under the abdomen of a female patient who has large breasts.	105	81	25	19
3. The arms may be flat at the patient's side or flexed at the elbow with the hands near the patient's head. Place hand-rolls if needed.	129	99	1	1
4. With tall patients, the feet should extend beyond the end of the mattress, so that they are pointing down in the space between the mattress and the footboard.	122	94	8	6

The Table shows that step 2 needs to be improved. It is very important in handling patients who have large breasts.

Table 13 shows the students' performance in sitting position.

Table 13
Students' Performance in Sitting Position

STEPS	S	Percent	US	Percent
1. In a chair, a patient's feet should be flat against the floor with the knees and hips at right angles.	130	100	0	0
2. The buttocks should rest firmly against the back of the chair, and the spine should be in straight alignment.	125	96	5	4
3. Avoid placing pillows at the back.	116	89	14	11
4. Support the patient's elbows with arm rests. Place hand-rolls, if needed. A footrest may be needed for shorter patients.	110	85	20	15

As shown in Table, step 4 was either performed incorrectly or not at all by the students. They forgot this step because some chairs used by the students during the demonstration have no arm rest and foot rest. All students got satisfactory in Step 1.

The students' performance in therapeutic positions is shown in Table 14.

Table 14
Students' Performance in Therapeutic Positions

STEPS	S	Percent	US	Percent
1. Fowler's Position – the patient is in a supine position with the head of the bed elevated 18-20 inches (approximately 45 degrees).	124	95	6	5
2. High Fowler's Position – the patient is in a supine position with the head of the bed elevated to an angle of more than 45 degrees.	130	100	0	0
3. Semi-Fowler's Position – the patient is in supine position with the head of the bed elevated to an angle of less that 45 degrees (20-30 degrees).	126	97	4	3
4. Orthopneic Position – the patient sits up in or at the edge of the bed with an overbed table across his or her lap. The table is padded with a pillow and elevated to a comfortable height. The patient leans forward and rests head and arms on the table.	121	93	9	7
5. Dorsal Recumbent Position – the patient is in a supine position with knees flexed. This is often used as position of comfort for patients with back strain.	119	92	11	8

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6. Lithotomy Position – the patient is supine. Both knees are flexed simultaneously so that the feet are brought close to the hips. The legs are separated widely, maintaining the flexed position.	116	89	14	11
7. Sim's Position – this is a side-lying position that uses only a single supporting pillow under the head. The patient is turned far enough onto the abdomen that the lower arm is extended behind the back & both knees are slightly flexed.	105	81	25	19

The Table reveals that of all the therapeutic positions, Sim's position had more unsatisfactory rating than the others. High Fowlers position was done perfectly by the students.

Table 15 shows the students' performance in shoulder lift.

Table 15
Students' Performance in Shoulder Lift

STEPS	S	Percent	US	Percent
1. The patient is assisted into a sitting position with knees flexed.	123	95	7	5

2. Bed is in low position. Each nurse faces the head of the bed. The nurse's knee near the bed is placed on the bed next to the patient's hips. The nurse slide far arm & hand gripping the headboard and near arm under patient's thighs.
     OR
  Each nurse faces the head of the bed with feet wide apart and knees placed
	123	95	7	5

STEPS	S	Percent	US	Percent
against bed; the arm nearest the head of the bed is placed perpendicular to the mattress and behind the patient's buttocks; the hand is placed palm down on the mattress (60 to 90° angle foot position).				
3. The other arm is placed under the patient's thighs.	128	98	2	2
4. The patient's arms are positioned on the nurse's shoulders and down their backs.	126	97	4	3
5. On the count of three, the patient pushes down as the nurses pull against the headboard and push up with the thigh muscles in the leg on the bed. OR On the count of three, the patient pushes down on the nurse's backs, and transfer their weight over the pivot arm to move the patient.	127	98	3	2

The Table reveals that the shoulder lifting procedure was satisfactorily done by the students. This implies that the students understood the rationale of each steps.

Table 16 shows the students' performance in moving patient up or down in bed.

Table 16
Students' Performance in Moving Patient up or down in bed

STEPS	S	Percent	US	Percent
1. Face opposite direction of movement.	128	98	2	2
2. One nurse on each side of the bed.	129	99	1	1
3. Foot close to bed is back, and far foot is forward 1 1/2 feet. Front feet is parallel	108	83	22	17

STEPS				
to be; rear foot points toward side of bed at a 60 to 90º angle to other foot.				
4. Patient's knees are flexed.	123	95	7	5
5. Each nurse places arms under patient's shoulder and thigh.	125	96	5	4
6. Nurse's knees are flexed; backs straight.	105	81	25	19
7. On count of three, both nurses shift their weight to the back leg.	110	85	20	15
8. Patient reposition in good alignment.	114	88	16	12

The Table shows that step 6 was the lowest and more unsatisfactory performed than the other steps. This step should be done perfectly to prevent straining nurse's back which could lead to injury. Some students got unsatisfactory in other steps maybe because it was not easy to move the patient up and down in bed especially if the nurses were diminutive and the patients were bulky if not large.

The students' performance in moving patient to the side the bed in supine or prone position is shown in Table 17.

Table 17
Students' Performance in Moving Patient to the
Side of the bed in supine or prone position

STEPS	S	Percent	US	Percent
1. Lower bed rail on side to which patient will be moved.	102	78	28	22
2. Face side of bed and brace one knee against bed.	129	99	1	1
3. Place feet appropriately 1 1/2 feet apart with forward foot pointing toward side of bed and back foot at a 60 to 90º angle to front foot.	109	84	21	16
4. Reach under patient to hold head and shoulder area in one arm, lower chest area	120	92	10	8

in other arm.				
5. Flex knees and shift weight to back leg while pulling with biceps and pushing against bed with knee to move patient's upper body to side of bed.	105	81	25	19
6. Reach under patient to hold waist and thigh area and repeat step 5.	115	88	15	12
7. Reach under patient's legs and repeat step 5.	111	85	19	15
Weighted Mean				

As shown in the Table, some students had difficulty in step 1. During their performance, some beds had no side rail. They forgot to assume lowering the side rail. Steps 3,5 and 7 need to be enhanced. Some of the students failed to perform those steps correctly. It is significant to prevent further injury to the patient as well as to nurses.

The students' performance in turning patient from supine to lateral is shown in Table 18.

Table 18
Students' Performance in Turning Patient
from Supine to lateral

STEPS	S	Percent	US	Percent
1. Flex the patient's far knee and put far leg over near leg.	125	96	5	4
2. Place the patient's far arm across the chest.	123	95	7	5
3. Position feet wide apart, with front one facing side of bed and back one at a 60 to 90° angle to front foot.	116	89	14	11
4. Place pillows on bed nest to patient as needed for abdominal or breast support in prone position.	115	88	15	12

STEPS	S	Percent	US	Percent
5. Place feet wide apart (1 1/2 ft.), one forward pointing toward side of bed, one behind at 60º angle to front foot.	114	88	16	12
6. Place one hand near patient's shoulder and one hand near patient's thigh.	124	95	6	5

7. a. Turn patient onto far side by shifting weight forward and pushing on shoulder and hip area.
OR
  b. After moving patient to side of bed, put up side rail; go to other side of bed; reach across bed; grasp patient behind shoulders and thigh area; shift weight backward and pull patient over onto side.
 	
  Continue pulling (7b) or pushing (7a) and allow patient to roll onto abdomen.
	125	96	5	4

The Table shows that turning patient from supine to lateral was satisfactorily done though a few students got unsatisfactory rating. This implies that it is an easy procedure and the students had mastered the procedure.

Table 19 shows the students' performance in total lift transfer.

Table 19
Students' Performance in Total Lift transfer

STEPS	S	Percent	US	Percent
1. Patient place in supine position on flat bed or cart.	125	96	5	4
2. Cart is positioned at right angle to the bed with head area near foot of bed.	130	100	0	0
3. All lifters positioned on same side of	122	94	8	6

bed with one foot forward and one foot back at 60 to 90º angle to front foot. The leg nearest the cart to which the patient will be moved is the front leg.				
4. Patient's arms are placed across the chest.	129	99	1	1
5. Tallest nurses places one arm under patient's head and shoulders. Second nurse places arms under waist and thighs. Third and shortest nurse places one arm under upper legs and one under lower legs.	128	98	2	2
6. Patient moved to side of bed or cart.	130	100	0	0
7. Nurses rest elbows on bed and roll patient into their arms, supported against their chests. Pt. rolled on count of 3.	106	82	24	18
8. On the count of three, all nurses shift weight to back leg as patient is lifted from the bed.	114	88	16	12
9. As one nurse calls out "step", all nurses move one step backward and take steps forward to reach cart.	101	78	29	22
10.Original foot stance resumed.	109	84	21	16
11.Nurses lower elbows to carb by slowly flexing knees.	105	81	25	19
12.On count of three, all nurses relax arms slowly as patient rolls onto the cart in a supine position.	123	95	7	5
13.Nurses remove arms from under patient and position in middle of cart as needed and put up side rails.	129	99	1	1

The Table reveals that step 2 and 6 were perfectly done while steps 7, 9, 10, and 11, were not performed correctly. Three nurses were

needed in transferring patient from one bed to the other. One should be a leader during the transfer to synchronize their movements.

Table 20 shows the students' performance in moving patient into sitting position at the side to bed.

Table 20
Students' Performance in Moving Patient into
Sitting Position at the side of the bed

STEPS	S	Percent	US	Percent
1. Move patient to side of bed.	104	80	26	20
2. Elevate head of bed to maximum point putting patient in high fowler's position.	120	92	10	8
3. Assist patient to move legs off side of bed with heels and lower legs dangling.	108	83	22	17
4. Face head of bed to move legs off side of bed with heels and lower legs dangling.	117	90	13	10
5. Feet placed wide apart (1 1/2 feet).	112	86	18	14
6. Place far arm around patient's shoulders; arm near bed placed under patient's knees.	109	84	21	16
7. As patient pushes up from bed with one arm (if able), the nurse bends the knees, shifting weight downward and swinging patient's legs down and shoulders up.	111	85	19	15
8. Patient supported at side of bed by shoulders with feet flat on floor.	109	84	21	16

The Table reveals that this procedure was satisfactorily done by the students but needed to be enhanced to make it perfect. There were still a few students who had difficulty in performing some of the steps.

Table 21 shows the students' performance in transferring patient from bed to wheelchair.

Table 21
Students' Performance in Transferring Patient
from Bed to Wheelchair

STEPS	S	Percent	US	Percent
1. Position chair on wheelchair next to bed on patient's strong side, (if patient has weak side).	122	94	8	6
2. Bring patient into a sitting position at the side of the bed.	130	100	0	0
3. Put transfer belt around patient's waist and secure.	130	100	0	0
4. Nurse's feet are wide apart, one foot pointing toward side of bed, the other toward chair.	116	89	14	11
5. Brace patient's close knee with front leg; nurses other leg is back to create wide base of support.	117	90	13	10
6. Patient's arms are positioned on nurse's shoulders.	128	98	2	2
7. Nurse's knees are well flexed with back straight, handle gripping each side of transfer belt.	121	93	9	7
8. On count of three, nurse shifts with thigh muscles as patient exerts effort to stand. The nurse pulls up on the transfer belt to assist the patient's efforts.	123	95	7	5
9. Patient asked to move leg closest to wheelchair forward (if possible).	129	99	1	1

As shown in the Table, the steps of transferring patient from bed to wheelchair were almost perfectly done by the students. It means that the students have mastered the procedure.

Table 22 shows the performance of the students in transferring patient from bed to chair.

Table 22
Students' Performance in Transferring Patient
From Bed to Chair

STEPS	S	Percent	US	Percent
1. The patient assumes a sitting position on the edge of the bed and puts on shoes and dressing gown.	119	92	11	8
2. Chair is placed at the side of bed with its back toward the foot of the bed.	122	94	8	6
3. Stand facing the patient, the nurse's foot closes to the chair is a step in front of the other.	120	92	10	8
4. Grasp the patient's waist as patient places his/her hands upon the nurse's shoulders.	118	91	12	9
5. The patient steps to the floor, and the nurse flexes her knees so that her forward knee is against the patient's knee.	99	76	31	24
6. Turn with the patient while maintaining wide base of support. Bend knee as the patient sits on chair.	104	80	26	20

The Table reveals that some of the students had difficulty in step 5 and step 6. It needed to be improved to prevent injuries to the patient as well as to the nurse.

Table 23 shows the performance of the students' in transferring patient from chair to bed.

Table 23
Students' Performance in Transferring Patient
from Chair to Bed

STEPS	S	Percent	US	Percent
1. Bring the chair directly along side of the bed with the patient facing the foot of the bed. Place a pillow on the arm of the chair.	116	89	14	11
2. Lift the patient's legs onto the edge of the bed. Flex the knees and lower the body, and support both the patient's legs when coming to an erect position.	118	91	12	9
3. Go behind the chair, grasp the patient under the axillae from the rear, and roll him onto bed having a wide base of support and rock to move the patient onto bed.	119	92	11	8
4. Move the chair and help the patient into the desired position. Slide the chair with your foot and brace yourself against the bed.	112	86	18	14

As shown in the Table, most of the students got satisfactory in all the steps. This means that they can manage to transfer a patient from a chair to the bed.

Table 24 shows the performance of students in hot water bag application.

Table 24
Students' Performance in Hot Water
Bag Application

STEPS	S	Percent	US	Percent
1. Gather the equipment.	126	97	4	3
2. Test the temperature of the water with a bath thermometer before pouring it into the bag.	127	98	3	2

3. Fill the bag about 2/3 full. Air remaining in the bag can be expelled in one of two ways:
  - place bag on a flat surface, permit water to come to the opening, then close the bag.
  - hold bag up, twist unfilled portion to remove air, then close the bag.
	128	98	2	2

4. Hold the bag upside down to test for leaks after securing the cap.	129	99	1	1
5. Bring equipment to patient's bedside.	127	98	3	2
6. Wash hands.	121	93	9	7
7. Apply a flannel cover over the bag before applying it. The cover may be warmed so that patient has an immediate feeling of warmth when it is applied.	124	95	6	5
8. Check the patient's skin while the bag is being used at regular intervals.	117	90	13	10
9. Change the water in the bag approximately every hour.	119	92	11	8
10. When through, position the patient comfortably.	126	97	4	3

The Table shows that hot water bag application was almost perfectly done by the students. This implies that many students had mastered the procedure.

Table 25 shows the performance of students in hot compress application.

Table 25
Students' Performance in Hot Compress Application

STEPS	S	Percent	US	Percent
1. Check doctor's order for the treatment.	123	95	7	5
2. Gather equipment.	124	95	6	5
3. Identify correct patient & explain the procedure.	115	88	15	12
4. Bring equipment to bedside. Heat the prescribed solution to approximately 40.5°C (105°F).	121	93	9	7
5. Wash hands.	116	89	14	11
6. Soak the compress in the solution and with the use of forceps, wring them out sufficiently so that no solution drips.	125	96	5	4
7. Using forceps, apply the compress to the designated area, and check to see that it is comfortable to the patient and not too hot.	124	95	6	5
8. Cover the compress with a moisture-proof material and a towel. For large body areas, an external heat source (heating pad, water bag) can be applied.	113	87	17	13
9. Continue the treatment for the time prescribed, as little as 20-30 minutes to an eye and as long as an hour for larger body areas.	112	86	18	14
10.Keep the patient warm and free of drafts during and after treatment.	113	87	17	13
11.When treatment is done, remove compress, & pat the skin of the area dry.	124	95	6	5

12.Make the patient comfortable.	128	98	2	2

The Table shows that steps 8,9,10 should be improved to make it perfect. Only few students got unsatisfactory rating in each step.

Table 26 shows the performance of students in applying dry cold.

Table 26
Students' Performance in Applying Dry Cold

STEPS	S	Percent	US	Percent
1. Gather equipment.	125	96	5	4
2. Wash hands.	126	97	4	3
3. Fill the bag with ice chips to about 2/3 full.	128	98	2	2
4. Remove air from the ice bag in the same manner as removing air from a hot-water bag.	125	96	5	4
5. Secure the cap and test the ice bag for leaks.	126	97	4	3
6. Bring equipment to patient's bedside.	127	98	3	2
7. Cover the ice bag with a wash cloth.	121	93	9	7
8. Apply the ice bag to the affected part for only 1/2-1 hour, and then remove it for about an hour before reapplying it.	95	73	35	27
9. After treatment, pat dry the affected part & assess its condition.	115	88	15	12
10.Position the patient comfortably.	126	97	4	3

As shown in the Table, step 8 should be checked to prevent from further injuries from occurring. Many students got wrong in this step, maybe because they did not know the rationale behind.

Table 27 shows the performance of students in cold compress application.

Table 27
Students' Performance in Cold Compress Application

STEPS	S	Percent	US	Percent
1. Gather the equipment. Bring them to patient's room.	126	97	4	3
2. Wash hands.	121	93	9	7
3. Place pieces of ice and a small amount of water in a clean basin.	124	95	6	5
4. Immerse the material to be used for application in the basin.	127	98	3	2
5. Wring the compress thoroughly before it is applied to avoid dripping.	128	98	2	2
6. Compresses should be changed frequently. Application should be continued for 15-20 minutes and repeated every 2-3 hours.	108	83	22	17
7. Ice bags or commercial devices can be place on top of the compress.	98	75	32	25
8. After the prescribed time, remove compress,pat the skin dry, and assess its condition.	121	93	9	7

The Table reveals that in cold compress application more students got satisfactory rating except for step 7. There were 32 students who failed and forgot to demonstrate step 7. This step needed to be perfect to prevent further damage to patients.

4. Summary, Conclusions and Recommendation

Table 28 shows the summary of the students' weaknesses.

Table 28
Summary of the Students' Weaknesses

Handwashing:	US	Percent

6. Wash your hands and arms up to your elbows, adding soap as needed. Keep your hands lower than your elbows at all times.
  a. Rub briskly, using friction and a rotary motion (as opposed to a back and fourth motion.)
  b. Pay particular attention to the areas between your fingers, your knuckles, and the outside surfaces to the fifth or "little" fingers.
	67	52

Oral Temperature		
2. Rinse thermometer in cold water if kept in a chemical solution and wipe dry with wipes using a firm twisting motion from mercury bulb to top.	38	29
Radial		
3. Ask about activity level with in last hour.	44	34
Apical - Radial		
11. Subtract the pulse rate from apical rate to obtain the pulse deficit.	27	21
Respiration		
3. Check Lighting.	28	22
7. Observe respiratory pattern and depth of respirations.	29	22
9. Compare respiratory rate with previous reading.	38	29
Blood Pressure		
9. Inflate cuff 30 mmHg. Higher.	48	37
14. Continue to release air and note level of mercury when the beat is heard – diastolic.	27	21

Positioning a Patient		
4. Plan the moving technique.	30	23
Total Lift		
9. As one nurse calls out "step", all nurses move one step backward and take steps forward to reach cart.	29	22
Transfer from Bed to Chair		
5. The patient steps to the floor, and the nurse flexes her knees so that her forward knee is against the patient's knee.	31	24
Applying Dry Cold		
8. Apply the ice bag to the affected part for only 1/2-1 hour, and then remove it for about an hour before reapplying it.	35	27
Cold Compress		
7. Ice bags or commercial devices can be place on top of the compress.	32	25

As shown in the Table, these are the steps in the procedure with 20 percent of the respondents got unsatisfactory in their performance which means students are weak in these steps. These need to be given greater intervention to achieve mastery.

Conclusions

1. Overall the students' performance in all nursing procedures is satisfactory, while their lowest performance was in the hand washing procedure and vital signs taking. No students got unsatisfactory rating in apical-radial pulse taking, total shoulder lift and cold compress. More students got unsatisfactory rating in moving patient to side of the

bed in supine position, moving patient into sitting position at the side of the bed and transfer of patient from bed to a chair.

Their strengths in each nursing procedure were : explain procedure to patient, leave in place 3 to 5 minutes, take pulse and respiration for full minute each, count pulse & respirations, washing their hands, obtaining any needed supportive devices or assistance, the patient lies on her back, with the spine in straight alignment, place a low pillow under the head, in a chair, a patient's feet should be flat against the floor, high fowler's position- the patient is in supine position with the head of the bed elevated to an angle of more than 45 degrees, cart is positioned at right angle to the head area near foot of bed, patient moved to side of bed or cart, bring patient into a sitting position at he side of the bed, put transfer belt around patient's waist and secure.

Recommendation

There should be a repeat demonstrations and return demonstration of hand washing procedure and vital signs taking before the BSN-II students will be exposed to the hospital for enhancement this summer.

Intervention Program

Based on the result of the study, the researcher found out that hand washing procedure and vital signs taking needs to be enhanced. During the first two week of classes in Primary health care laboratory 2 (second semester 2006-2007), the clinical instructor demonstrated again the proper procedure in handwashing and vital signs. The students performed again the handwashing procedure in the nursing arts laboratory with the supervision of the clinical instructor. The students also performed again the blood pressuretaking, oral and axillary temperature taking, radial pulse, radial-apical pulse and respiration. During the students' demonstration, one student was the patient and the other one was the nurse. It was a graded performance.

During the students' community health nursing exposure in Labinay, Diguan, Sinuza and Litapan (second semester 2006-2007),

they were required to bring their blood pressure apparatus and take the blood pressure of some of the residents in their assigned area. This is one way of improving their skills in blood pressure taking.

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About the Authors

Merven M. Pailden is a graduate of Bachelor of Science in Physics at Mindanao State University-Marawi City in 2002. He completed the academic requirements for Master of Science in Teaching Physical Science while he earned some units in MS Education major in mathematics and Master of Science in Statistics. He was able to publish some articles in the journals of Samahang Pisika ng Visayas at Mindanao.

Mary Lizbeth M. Caballo, graduated from MSU-Iligan Institute of Technology as Cum Laude with the degree of BS Zoology. She finished Master of Education major in Biology in De La Salle University, Manila in 2001 and currently the Coordinator of the Science Departtment.

Aldrich T. Caballo finished his Baccalaureate degree in Xavier University, Cagayan de Oro City. He is a licensed Mechanical Engineer and currently a student in Master of Physics at MSU- Iligan Institute of Technology.

Eunel P. Malig-on is a graduate of Bachelor of Arts Major in Philosophy and Minor in English. He finished his Masters Degree in Teaching Social Studies at La Salle University. An Assistant Professor from the Social Sciences Department, College of Arts and Sciences La Salle University handling Philo I Logic, Moral Philosophy, Philosophy of the Human Person and History subjects.

Maria Nancy Q. Cadosales, PhD, is an Associate Professor at La Salle University, Ozamiz City. She earned her Master of Arts in School Counseling at De La Salle University, Taft Avenue, Manila in June 1998, Master of Arts in Education at La Salle University, Ozamiz City in March 2000 and Doctor of Philosophy in Education at the University of San Carlos, Cebu City in May 2004. Presently, she serves as Dean of the Graduate School of Business, Education, Arts and Sciences.

Benito S. Dumaog is presently a senior instructor in Elementary Mathematics 4, 5 and 6 at La Salle University Integrated School. He was also a critic teacher in Mathematics in the Grade School of formerly Immaculate Conception College for more that 25 years. He coached for the contestants to the Division and Regional Super Quiz Bee in Mathematics and to the MTAP Challenges and won the top places.

Evelyn Joy D. Neri is a Chemical Engineering graduate of Mindanao State University- Marawi City in 1988. She finished her Masteral degree in Science ICC- La Salle, Ozamiz City in 1997. She received two plaques of recognition from DOST- Region X as coach awardee of DOST sponsored " GAWAD AGKATER" community- based project- Regional Level competition, and as Science Club Adviser Awardee on Science Investigatory Project on " Thermoplastic as Additive on Asphalt" Regional Level Competition. She is presently employed as college instructor of LSU teaching Chemistry and other cognate.

Maria Cristina M. Llauder received a B. S. E. degree in Chemistry from MSU- Iligan Institute of Technology. She completed her masteral education in Chemistry at La Salle University-0zamiz city, on March 2007. Ms. Llauder is one of the faculty in the college department of LSU teaching undergraduate chemistry lecture and laboratory courses.

Emma O. Suana is presently the Dean of the College of Arts and Sciences at La Salle University. She earned her Master in Teaching Mathematics at Immaculate Conception College-La Salle in October 1997, Master in Education major in Mathematics at Immaculate Conception College-La Salle in October 2002 with her thesis entitled "Performance of College Algebra Students: Basis for Proposed Mathematics Modules."

Arlene Apao is a graduate of Bachelor of Science in Nursing in 1992. She earned her Master in Nursing major in Nursing Education Administration in March 2006 while she earned her Master of Arts in Nursing in March 2007. She is currently the school nurse of La Salle University-Integrated School. She has been with La Salle for 13 years, of which one year was spent teaching in the College of Nursing.

For any queries email lsuresearch@yahoo.com
or write
The Lasallian Research Forum,
La Salle University Ozamiz City, 7200
Or call
(088) 521-0342 (117)