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A survey on physical hazards: Towards a safe and healthy University of Baguio community

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Abstract

Due to the presence of various structures, laboratories, clinics, canteens, machine shops, offices and other facilities, employees in the University may be exposed to a varied and large number of physical hazards. This study aimed to identify the hazards commonly encountered by the employees associated with their work and determine the extent to which these hazards were observed. This study also assessed if there have been actions undertaken by the stakeholders to reduce the risks in some areas in the University based on the OSH audit done in February 2013. A descriptive survey method was employed in this study that consisted of the use of survey and structured open-ended questionnaires, documentary analysis, and field observations. The results of the survey revealed that nonteaching employees were exposed to a MODERATE degree of physical hazards associated with housekeeping, electrical connections, air quality, hand tools/materials, fire, and lighting; and HIGH degree with noise, and

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availability of first aid materials. Teaching employees, on the other hand, were exposed to a MODERATE degree of physical hazard associated with housekeeping, hand tools/materials, fire, lighting, and availability of first aid materials; and HIGH degree with noise, electrical connections, and air quality. T-Tests showed that in general there were significant differences between the level of hazards encountered by non-teaching and teaching employees. Documentary analysis and field observations revealed that the stakeholders did not fully address the risks identified in some areas based on the audit done in February 2013. Recommendations were formulated by the researchers based on the result of the study.

KEYWORDS: PHYSICAL HAZARDS, NON-TEACHING, TEACHING EMPLOYEES

Introduction

orkplace Health and Safety Handbook (2006) defines hazard as something that has the potential to harm the health, safety, and welfare of people at work. Hazardous things as classified by the "Introduction to hazard identification & risk assessment" (n.d.) include equipment, machinery, electricity, fuel gas, fire, noise, tools, and chemicals. In the case of equipment and types of machinery, the likelihood of harm increases with the deterioration of said things. Hazard is also associated with the way of working at a height, in confined spaces, lifting/handling, being alone, being trained/untrained and stressful working conditions. Likelihood of harm increases with prolonged time of exposure and with lack of training. Risk on the other hand, as defined by Workplace Health and Safety Handbook (2006), is the "likelihood that the hazard will cause injury, illness or disease in the way that it is used or occurs in the workplace, and the severity of the injury, illness or disease that may result". A physical hazard is a factor in the environment that can harm the body without necessarily touching it. Examples include frayed electrical cords, unguarded machinery, exposed moving parts, constant loud noise, vibrations, working from ladders, scaffolding or heights, spills and tripping hazards (Safety Training Environmental Safety Hazards 150, 2014). Physical hazards are often said to be less critical than chemical hazards, but this is not so. They can and do cause several health problems, injuries or even death. The nature of physical agents is broad and should not be underrated but the main ones capable of causing occupational disorders and injuries are noise, illumination, vibration, radiation (ionizing and non-ionizing) and microclimatic conditions in the case of extreme heat and cold (WHO, June 2013).

Venables and Allender (2006) commented that despite the risk and complexity of the hazards identified in universities, little had been written about the occupational health needs of this employment sector. By "needs" is meant not only information about hazard and risk, but also other information relevant to planning occupational health provision in universities. In the workplace, people face a variety of hazards almost as numerous as the different types of work. Such hazards include chemicals, biological agents, and adverse ergonomic conditions, etc. Globally, there are 2.9 billion workers who are exposed to hazardous risks at their workplaces. Annually there are two million deaths that are attributable to occupational diseases and injuries while 4% of Gross Domestic Product is lost due to occupational diseases and injuries (Meswani, 2008).

Because the University of Baguio is an academic and research institution, it can have a varied and large number of hazards, which can be attributed to the presence of various structures, laboratories, clinics, canteens, machine shops, offices and other facilities. An observational (walk-thru) onsite survey was conducted by two certified Basic Occupational Safety and Health (OSH) officers on February 13, 2013, around five identified areas in the University of Baguio to evaluate the

health and safety programs implemented by the University. Based on the findings obtained from OSH inspectors and the documents submitted, the University was marked FAIR concerning its health and safety programs. The absence of the organization's safety management plan and systems are significantly reflected on awareness, practices and technical aspects within the organization. Chemical, physical and biological hazards were identified from the five areas inspected. The results of the audit indicated a need to conduct another study to determine if there are significant improvements on the health and safety programs implemented by the University as a result of the recommendations made by the inspectors. In addition, since the walkthrough survey only covered five areas, namely the Central Supply Storage for Hazardous Materials, Mechatronics/ Machine Shop, Centennial Building, Canteen and Health Safety and Security Environment, there was a need to conduct a University-wide study on hazard and risk assessment employing the responses of the employees and faculty members from the different offices, laboratories and shops. It was with this premise that the researcher aimed to gather information on the hazards, risks and other relevant health factors encountered by the faculty and employees of the University of Baguio (UB). This study aimed to determine the level of exposure of the teaching and non-teaching employees to physical hazards associated with housekeeping, electrical connections, noise, air quality, hand tools/materials, fire, availability of first aid materials and lighting. Besides, the type and level of hazard were compared regarding the nature of work. This study also assessed if there have been actions undertaken by the stakeholders to reduce the risks identified in some areas in the University based on the OSH audit done in February 2013.

Methodology

Research Design

A descriptive survey method was employed in this study that

consisted of the use of survey and structured open-ended questionnaires, documentary analysis, and field observations.

The Sample

This study involved all full-time teaching and non-teaching employees of the University during the second semester School year 2014-2015. Personnel from the General Services and Technical Department were not part of the survey. Data provided by the Human Resource and Management Center indicated that as of 2nd semester 2014-2015, there were 158 full-time non-teaching and 306 full time teaching personnel employed in the University.

Distribution and retrieval of questionnaires were accomplished for a month. Despite several follow-ups from the different Schools, UB Laboratory Elementary School, UB High School and UB Science High School, only 109 fully accomplished questionnaires were retrieved from the teaching employees (36% response rate). A higher response rate was achieved from the non-teaching employees with 95 questionnaires retrieved out of 158 (60%). One of the main reasons for the low retrieval rate was that many employees did not give their consent to be part of the study after knowing that their medical record would be accessed through the Medical clinic, which was supposedly part of the data gathering procedures for this study. Also, some School secretaries and office heads disclosed that the questionnaires were randomly distributed to the employees of the School or office without monitoring who were given the questionnaires. This made it impossible for the researchers to follow up unreturned questionnaires. Anonymity/confidentiality policy of the study also affected the response rate. Some returned questionnaires were not completely answered, and since the respondents were not required to write their names, it was not possible for the researchers to verify the answers thus the said questionnaires were disregarded, lowering the response rate.

Survey Questionnaires

Part I of the questionnaire was a demographic survey to gather information on workplace characteristics, length of service in the University, position, nature of work and subject taught, if teaching. The length of service among 109 respondents from the teaching employees ranged from one semester to 26 years and the teaching hours ranged from 18 hours to 48 hours a week. Parts II to IV of the survey questionnaire were adapted from the Workplace Health and Safety Handbook (2006). Minor revisions were made in the checklist to suit the needs and context of the University. The researcher modified the choices of "yes", "no", or "n/a" and changed them to a four-point Likert scale for the respondents to indicate their responses ranging from 4 for always observed to 1 for never observed. Such modifications were done to identify potential hazards and at the same time to assess the level of hazards. The following interpretations were based on the Occupational health and safety management systems - Guide: British Standard, BS 8800, BSI 2004; and Managing Safety the Systems Way: Implementing OHSAS 18001 using BS 8800, BSI 2004.

- Never Observed (Not or with less than 1% chance of being observed/experienced by an individual during their working lifetime)
- 2 Sometimes Observed (Typically observed/experienced once during the working life of an individual)
- 3 Frequently Observed (Typically observed/experienced once every five years by an individual)
- 4 Always Observed (Typically observed/experienced at least once every six months by an individual)

Open-ended questions were also included in the abovementioned questionnaires (Part V) to determine as to how much, how often and for

how long employees were exposed to the different hazards. Since Parts II to IV of the survey questionnaire was adapted from the Workplace Health and Safety Handbook (2006) validity was not anymore established. The said questionnaire was tried out using 17 teaching and non-teaching employees of Union Christian College located at San Fernando, La Union, to establish its reliability. The summary of the final reliability test result is shown in Table 1.

Data Collection Procedure

Parts II to IV of the questionnaire were utilized to determine the level of exposure of the University employees to physical hazards. Responses to the open-ended questions (Part V) were analyzed to further validate the responses of the employees from Parts II to IV of the questionnaire.

Table 1

Summary of the Reliability Test Results

Areas Associated with Physical Hazards							
Indicators	No. of items	Cronbach Alpha	Interpretation				
Housekeeping	13	0.862	Very Good Reliability				
Electrical Connections	4	0.900	Excellent Reliability				
Noise	4	0.798	Good Reliability				
Air Quality	5	0.864	Very Good Reliability				
Hand Tools/Materials	4	0.983	Excellent Reliability				
Fire	8	0.927	Excellent Reliability				
First Aid	6	0.851	Very Good Reliability				

Before the conduct of the survey, permission through a letter was sought from the Director of the Research and Development Center and the Vice President (VP) for Academic Affairs of UB. Copies of the approval letter were sent to the different School Deans, Principals, and

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Heads of Offices together with the survey questionnaires and consent forms. Employees were asked to sign a consent form which included the objectives of the study. This was to ensure that the participants fully understood why they were invited to participate in the study and that participation was voluntary. All participants were assured that all the information gathered in the survey would be held in strict confidentiality. The participants were informed of their rights as indicated in the consent form. These rights include but are not limited to the participants' right to: be informed of the nature and purpose of the study; be given an explanation of the procedures to be followed in the study, and device to be utilized; be given a description of any foreseeable risk, pain or discomfort, or inconvenience to the individual (or others) be given an explanation of any benefits to the subject reasonably to be expected, if applicable; be given an opportunity to ask questions concerning the study or the procedures involved; be free to refuse to participate or withdraw from the research at any time without penalty or loss of benefits to which he/she is entitled; be given a copy of the signed and dated consent form; and be given the opportunity to decide to consent or not to consent to a study without the intervention of any element of force, fraud, deceit, duress, coercion or undue influence on the subject's decision (Philippine National Health Research System, 2011).

Since only a few of those who answered the questionnaire gave their consent for their medical record to be accessed from the Medical Clinic, the researchers decided to eliminate this part of the data gathering procedure. The amount of data gathered from the health records may not be enough to cross-validate the results of the survey.

The researchers conducted informal interviews, field observations and documentary analysis to determine the actions undertaken by the stakeholders to reduce the risks identified in some areas in the University based on OSH officers' audit conducted last February 2013 (Saong, 2013).

Statistical Treatment

Weighted means were computed from the responses of the employees to Parts II to IV of the survey questionnaire. Weighted means were used to determine the degree by which the hazards are observed or encountered by the employees. The weighted mean values were interpreted as follows:

3.25 - 4.00 - Very High Degree/Always observed
2.50 - 3.24 - High Degree/Frequently observed
1.75 - 2.49 - Moderate Degree/Sometimes observed
1.00 - 1.74 - Low Degree/Never observed

T-test was used to determine if there are significant differences in the level of exposure to physical hazards between non-teaching and teaching employees.

Results and Discussion

Housekeeping

Table 2 shows that non-teaching and teaching employees were exposed to a MODERATE degree of physical hazards associated with housekeeping. Among the 13 indicators used in the survey, both groups had the lowest mean on "Stairways", with Mean=1.71 for non-teaching and Mean=1.61 for teaching. The result implies that teaching and non-teaching were exposed to low physical hazard in this area because stairways in the University were always provided with substantial handrail or handhold. Another indicator in the questionnaire entails that the floors of all offices and passageways, corridors, storerooms or stairways were not always covered with non-slip material. Employees' moderate exposure to physical hazard can also be attributed to the fact

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that the management has not fully developed a system for immediately fixing faulty equipment, as revealed in the survey. Informal interviews with office and laboratory personnel revealed that despite the absence of a system, concerns involving faulty equipment or office materials were usually addressed by accomplishing a Job Request Form. The said form is forwarded to the Electrical Department, Carpentry, MIS or CPDO depending on the material or equipment to be fixed. Because of the absence of a system, some concerns are addressed immediately within a day while some for a few days or weeks. Likelihood of harm increases with prolonged time of exposure and with lack of training. As revealed in the survey, employees were exposed to a MODERATE degree of physical hazard because they were not well trained or properly advised on the correct way to access filing cabinets. According to Baker and Wallerstein (2011), positive results are produced from trainings which are based on clearly defined needs specific to the workplace. Also, if it is delivered with a view to those needs and the ways in which adults learn. Health and safety trainings serve a better purpose if they empower workers to take an active part in making the workplace safe, rather than simply to encourage worker compliance with management safety rules.

Table 2

Comparison of the Mean level of Physical Hazard Associated with Housekeeping using t-test

Employee	Ν	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.02	Moderate	0.47	2 026	.004*
Teaching	109	2.22	Moderate	0.48	-2.950	

*significant p < 0.05

Filing cabinets and their location near doors, corridors and frequently used passages also posed a MODERATE degree of physical hazard to the employees. Employees were exposed to a MODERATE

degree of physical hazards because sometimes obstructions were found on the floors of offices and passageways, corridors, storerooms or stairways. Observations by the researcher would show that hallways, passageways, and stairways were sometimes utilized by students as hang out areas while waiting for their next class or reviewing for quizzes and examinations, completely disregarding signage that "Stairs must be kept clear of all obstructions". In addition, these areas were not frequently properly maintained and were inadequately illuminated, as revealed by the survey.

The presence of tripping hazards in some areas in the University and potholes in the car park near the Centennial building were also identified, as revealed in the survey and from the open-ended questions. Although the presence of tripping hazards was visible in the car park area, this only posed a MODERATE degree of physical hazard because not all respondents were utilizing the car park. It was also revealed from the open-ended questions that some office workers made use of chairs to bring files needed for storage up as high as ten feet. Sometimes student assistants were asked to help. Such activity also exposed the personnel to tripping hazards. Manchester Metropolitan University (2006) reported that the most common causes of accidents, not just in the university but in industry commerce and the service industries are slips, trips, and falls.

The results of the survey imply that housekeeping practices in the University can still be improved to decrease the level of exposure to physical hazards. As emphasized by the Canadian Center for Occupational Health and Safety (2014), effective housekeeping can eliminate some workplace hazards and help get a job done safely and properly. Poor housekeeping can frequently contribute to accidents by hiding hazards that cause injuries. If the sight of paper, debris, clutter, and spills is accepted as normal, then other more serious health and safety hazards may be taken for granted. Housekeeping is not just cleanliness. It includes keeping work areas neat and orderly; maintaining halls and floors free of slip and trip hazards; and removing of waste materials

(e.g., paper, cardboard) and other fire hazards from work areas. It also requires paying attention to important details such as the layout of the whole workplace, aisle marking, the adequacy of storage facilities, and maintenance. Good housekeeping is also an essential part of accident and fire prevention.

Despite having the same degree of exposure to the physical hazards associated with housekeeping, t-test would show that there was a significant difference (p<0.05) in the mean level of exposure between non-teaching and teaching employees. The higher mean level for teaching employees can be attributed to the nature of their work. As confirmed from the open-ended questions, teaching employees most of the time transfer from one classroom to another or from one building to another, thus, constantly making use of corridors, passageways, and stairways. Some respondents even revealed that they had to go up from the ground to the ninth floor using the stairs if elevators are not working. In addition, teaching employees handle a lot of paper works, which necessitates the use of more filing cabinets than non-teaching employees, as evidenced by the number of lockers or filing cabinets provided for faculty members in the University. In comparison, in most offices, work is of a sedentary nature and involves levels of visual and mental concentration, and very often much of the work is carried out on display screen equipment (Manchester Metropolitan University, 2006). These can also be seen as typical characteristics of an office environment in the University of Baguio. Most of the non-teaching employees in this study were office workers carrying out clerical and administrative work activities. As revealed from the open-ended questions office workers made use of stairs only when going to and from their respective offices; when there are medical emergencies; during classroom evaluation; providing internet cables from source to destination, or going from one office to another, wherein these activities were not done on a regular basis.

Electrical hazard

Table 3 shows that non-teaching employees were exposed to a MODERATE degree (Mean=2.33) while teaching employees were exposed to a HIGH degree (Mean = 2.60) of electrical hazards. T-Test shows that there was a significant difference (p<0.05) in the level of exposure to electrical hazard between non-teaching and teaching employees. Electricity has long been recognized as a serious workplace hazard, exposing employees to electric shock, electrocution, burns, fires, and explosions. In 1999, for example, 278 workers from the United States died from electrocutions at work, accounting for almost 5% of all onthe-job fatalities that year, according to the Bureau of Labor Statistics. What makes these statistics more tragic is that most of these fatalities could have been easily avoided. Some ways to prevent these accidents are through the use of insulation, guarding, grounding, electrical protective devices, and safe work practices (U.S. Department of Labor, 2002).

Table 3

Comparison of the Mean level of Physical Hazard Associated with
Electrical Connection using t-test

ive SD t-value Significa ition SD t-value level (2-t	ance ailed)
te 0.47	.008*
0.48	
t	e 0.47 -2.673 .008 0.48

*significant p < 0.05

The survey revealed that teaching employees were more exposed to electrical hazards than non-teaching employees because of the frequent use of extension cords. According to the U.S. Department of Labor (2002), most electrical accidents result from one of the following three factors: unsafe equipment or installation, unsafe environment, or unsafe work practices. In the University, most of the LCD projectors were not

installed in the classrooms, thus teaching employees had to bring the projectors to the classrooms together with the extension cords. Aside from the computer units provided in the faculty rooms and Dean's offices, many faculty members also used their laptops for the preparation of instructional materials and other academic requirements. Extension cords are considered temporary wiring by the National Electrical Code, which limits their use to a maximum of 90 days. Unfortunately, since the number of electrical outlets was not sufficient for the number of users, extension cords were utilized by teaching employees for one semester or more. Faculty members handling laboratory subjects also used extension cords to set up laboratory equipment. In comparison, based on researchers' observation and informal interviews, non-teaching employees especially office workers seldom use extension cords because computer units and other appliances were already directly plugged in the electrical outlets.

Another indicator in the questionnaire revealed that both groups were exposed to electrical hazards to a HIGH degree because as observed by the respondents, electrical cords and connections were not regularly inspected. The University has an Electrical Department responsible for the preventive maintenance of the generators, lighting facilities, power outlets and telephone/intercom connections. An informal interview with the personnel from the Electrical Department confirmed the result of the survey that prior to June 2015, electrical cords and connections were not regularly inspected. It was only when the new CPDO Director was installed in June 2015 that inspection was done every Saturday in all buildings in the University on a rotation basis.

There was a difference in the level of electrical hazard between non-teaching and teaching employees in terms of the use conditions of the cords used as further revealed in the survey. The HIGH mean level for the teaching employees implies that they frequently used cords which were not in as-new condition. It was revealed in the interview that the Electrical Department produced extension cords based on requests made by the different offices and Schools. But inspection on the condition and connections of the cords were not regularly done by the personnel of the said department. Changes on extension or electrical cords were only done when reported by concerned individuals. According to a report by the Manchester Metropolitan University (2006), nearly 75% of electrical faults are caused by faulty leads or plugs. An occasional visual check is all that is required to identify the majority of faults and no unauthorized electrical equipment must be permitted on the university's premises.

In this study, all appliances in use in the University were observed by both groups to be frequently suitable and in excellent condition, thus posing only a MODERATE degree of electrical hazard to the employees. It must be noted though, that inspection of appliances used in the University was not done on a regular basis since services were only sought from an external source.

Noise

Table 4 shows that non-teaching and teaching employees were exposed to a HIGH degree of hazard associated with noise. T-Test indicates that there was no significant difference (p>0.05) in the mean level of hazard between the two groups. As revealed in the survey, noise was a problem in the University, and there were distracting or disruptive noises in the work areas, which posed a HIGH degree of hazard to both non-teaching and teaching employees. Because screens or partitions to control noise were not generally available, both groups were exposed to noise to a HIGH level. Responses of 36 non-teaching employees who answered the open-ended questions on "noise" revealed that 23 (64%) of them experienced noise from students loitering at the corridors and hallways especially during dismissal time. Even personnel assigned at the library were exposed to the said source of noise. Seven (7) or 19% revealed that noise came from construction or repair works within the University premises and nearby streets and buildings. Three (3) or 8% also experienced noise from vehicles parking or passing along the gym area. Four (4) or 11% whose offices are located near the gym area complained about noise due to activities conducted at the gym.

The teaching employees also encountered the same circumstances as revealed from the open-ended questions. From the 45 teaching employees who answered the open-ended questions on noise 21 (47%) experienced noise from students loitering at the corridors and hallways especially during dismissal time. Six (6) teaching employees who held classes at the Centennial building complained about the noise created by construction work near the said building. Of the seven who experienced noise from vehicles, two were UBLES teachers. Two (2) experienced noise from ventilation or exhaust fans, and four (4) complained about noise due to activities conducted at the gym. One teaching employee also complained about the noise coming from a radio station situated beside the classrooms. According to WHO (2002), high noise levels can cause masking of warning signs, annoyance, and fatigue. Other harmful effects of noise are hypertension, hyperacidity, palpitations and disturbed relaxation and sleep.

Table 4

Comparison of the Mean level of Physical Hazard Associated with Noise using t-test

Employee	N	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.53	High	0.63	-0.178	.859
Teaching	109	2.54	High	0.57		

Air quality and temperature

Table 5 shows that in terms of the hazard associated with air quality and temperature, non-teaching employees were exposed to a

MODERATE degree (Mean=2.47) while teaching employees were exposed to a HIGH degree (Mean = 2.57). Despite the differences in the interpretation of the mean values, t-test showed that there was no significant difference (p>0.05) in the mean level of hazard between the two groups. As revealed in the survey, non-teaching and teaching employees were exposed to a HIGH degree of hazard because of problems with the temperature in the work area. Thermal comfort is subjective but describes an individual's satisfaction with his temperature environment. Some factors can affect thermal comfort including air movement, humidity, the type and amount of clothing worn, and the type of work being undertaken. The temperature in workrooms should normally be at least 16 degrees Celsius unless much of the work involves severe physical effort in which case the temperature should be at least 13 degrees Celsius. These temperatures may not, however, ensure reasonable comfort depending on other factors such as air movement and relative humidity (Manchester Metropolitan University, 2006). Responses of the non-teaching employees from the open-ended questions revealed that the installation of the façade at the UB Square Building made the offices situated in the said building very warm, especially during summer time. The offices concerned were: MIS Department, Library Extension, MAP, HRMC, CCSD, RDC, Accountant's office, Payroll, CPDO, Purchasing, OSA, and Medical Clinic. Because no natural heat and light enter some offices in the same building, the temperature got too cold during the cold season and warm during summer time, which was also heightened by the lack of ventilation. The design of some offices also caused temperature fluctuations. For instance, the Office of the Student Affairs has two open doors and four windows which exposed the personnel to extreme coldness during the cold season. Responses of the teaching employees especially those having classes or offices at the FB Building (A Building) revealed that some windows were already welded and can't be possibly opened. The condition hindered the flow of natural ventilation into the classrooms thus making the temperature too warm. Other teaching employees revealed that the warm temperature in

the classrooms, computer laboratory rooms, e-learning rooms, e-media room and production rooms were attributed to the lack of ventilation or air conditioning systems. Teaching employees with offices and classes at the Centennial Building complained that some windows were inoperable or difficult to open, possibly because of lack of maintenance, thus making offices and classrooms too warm especially during summer time. Another cause of temperature problems as also revealed by the respondents was the climate in Baguio City.

Table 5

Comparison of the Mean level of Physical Hazard Associated with Air Quality using t-test

Employee	N	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.47	MOderate	0.77	0.020	.354
Teaching	109	2.57	High	0.69	-0.930	

Indoor air quality (IAQ) posed a HIGH LEVEL of health hazard to the employees due to lack of fresh air as also revealed in the survey. Such case sometimes made the work areas seemed stuffy and made workers suffer from dry, irritated eyes at the end of the day. Lack of fresh air can be linked to lack of ventilation as revealed through the open-ended questions. Indoor air quality refers to the quality of air within a building, and it is an issue that is often left neglected. A study by Baksh (2013) revealed that poor IAQ is a significant source of health problems and discomfort for both employees and employers. In the health and safety industry, this is referred to as "sick building syndrome." Over the past decade, IAQ has become an important health and safety concern. In fact, the Environmental Protection Agency has ranked poor IAQ as one of the top environmental risks to public health. It's invisible and mostly unnoticeable, but it's more dangerous than many people realize; whether you're working on a manufacturing floor or in an office building, the quality of indoor air can be up to 100 times more polluted than outdoor air. Further, studies conducted by the American Heart Association and American Lung Association, have linked heart-related diseases and lung cancers to poor air quality.

Hand tools/materials

Table 6 shows that non-teaching and teaching employees were exposed to a MODERATE degree of physical hazard associated with the use of hand tools/materials. The result implies that the respondents did not regularly make use of hand tools due to the nature of their work minimizing their exposure to the hazard. In the University those who frequently made use of hand tools like clamps, cutters, pliers, wrenches, hammers, screwdrivers and other similar materials are the personnel from the Electrical, Carpentry and General Services Departments. The said personnel were not part of this study. Secondly, in case employees made use of hand tools, they were frequently provided with safe and suitable hand tools or materials for the work required. For instance, the personnel from the MIS department use some hand tools during repairs of computers, computer accessories, and printers. Laboratory instructors handling Science and Engineering courses were also frequently provided with safe and suitable hand tools or materials needed in class. Sharp materials as observed in the University premises were also commonly housed or stored to minimize the risk or injury. Despite the same degree of hazard, t-test shows that there was a significant difference (p<0.05) between the two groups with the teaching employees getting a higher mean.



Table 6

Comparison of the Mean level of Physical Hazard Associated with Hand Tools/Materials using t-test

Employee	Ν	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.00	Moderate	0.68	-2.594	010
Teaching	109	2.24	High	0.81		.010

Fire hazard

Table 7 shows that non-teaching and teaching employees were exposed to a MODERATE degree of fire hazard. T-Test further proved that there was no significant difference in the mean level of hazard between the two groups. Despite a MODERATE degree in the overall mean, one item in the questionnaire revealed that both groups were exposed to a LOW level of fire hazard because as observed by the respondents, extinguishers in the University were in place, clearly marked for the type of fire and recently serviced. This result confirmed the observation of the OSH officers during their walk-through survey in February 2013 "there was a good provision of adequate portable fire extinguishers in every building. Inspection tags were placed indicating the date of inspection and inspector's initials" (Saong, 2013). The results of the survey further confirmed the observation of the OSH officers in February 2013 that in all areas in the University, exit illumination and directional EXIT sign were provided, and there was provision of fire exit plan for each floor of the buildings showing the routes from each room to appropriate exits which were displayed prominently on each floor. These observations were consistent with the fact that the University was also compliant with the Bureau of Fire Protection as evidenced by the Fire Safety Inspection Certificate number 7713 issued on March 12, 2012.

Another item in the questionnaire showed that non-teaching

employees showed a MODERATE degree of hazard associated with direction notices for fire exits, notably higher than the teaching employees with a LOW degree of hazard. This can be explained by the nature of the work of the respondents. Non-teaching employees are mostly confined in their offices and do not go around the University campus. As such, they do not usually notice direction notices for fire exits in the different part parts of the University.

Table 7

Comparison of the Mean level of Physical Hazard Associated with Fire Encountered using t-test

Employee	Ν	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.03	Moderate	0.72	0.210	.827
Teaching	109	2.05	Moderate	0.72	-0.219	

The OSH officers also noted that two means of egress were provided for each floor in the University. Classrooms were also equipped with two doors to facilitate easier evacuation. Despite these, it was observed by the OSH officers that there was inadequate egress in the Centennial Building as evidenced by the dimension of the common door for entrance and exit of the building versus the possible maximum student capacity of the building going out in panic in case of emergency. The bottleneck model may occur which could lead to stampede, improper evacuation, and rescue in cases of emergency (earthquake, fire, etc.). One of the recommendations made by the OSH officers was the widening of the main access for entry and exit and also to consider debriefing building occupants of the rear exit of the building. Based on an informal interview with one CPDO personnel, it was known that the recommendations made by the OSH officers were forwarded to the Board of Directors of the University. But no evident actions were undertaken by the latter to address this concern.

Although not revealed in the current survey, OSH officers in 2013 identified another fire hazard in the University which was at the Central Supply Room (CSR). It was observed that while metal shelves were provided for some substances, the alcohol groups, which are flammable materials, were stored in a wooden shelf at the Central Supply Room (CSR). Fire hazard as per National Fire Protection Agency may be a consequence of spill or leak of the said substances. Conversion of fire susceptible shelves into metal shelves or keeping organic/flammable substances in the metal shelves was the recommendation given by the officers. As observed by the researcher and confirmed by the laboratory custodian, all wooden shelves at the CSR were already replaced with metal shelves, thus reducing the fire hazard in the area.

What can be more emphasized from the result of the survey is that the HIGH level of fire hazards encountered by the non-teaching and teaching employees was not due to the physical structures and facilities found in the University but on the lack of training on fire safety and on the need to regularly conduct emergency drills. As confirmed by personnel from one Administration office through an informal interview with the researcher, the last fire drill held in the University was in 2011. Besides, from the documents gathered by the OSH officers in 2013, there were no pieces of evidence to show that safety orientation has been incorporated within the individuals of the organization. There was no evidence to show that a program exists to heighten and elevate the awareness to safety as evidenced by the 2013 calendar of trainings and workshops from the HRMC Department. Based on the result of the OSH inspection, it was recommended that specific workshops may be officiated by the HRMC department to heighten awareness and understanding of every individual on safety, taking care of themselves, and their colleagues whenever any suspicious, or emergency situations arise (Saong, 2013). Informal interview conducted by the researcher with HRMC personnel reveal that despite the recommendations given by the OSH officers in 2013, few programs or workshops on safety were organized by HRMC during the School year 2014-2015 for teaching and non-teaching employees. Only a few employees also attended seminar or trainings on safety organized outside the University. Wilson (1989) emphasized that workers are usually exposed to risk either because of their lack of knowledge about workplace hazards due to limited experience and knowledge or failure to behave safely, which may be associated with the workers' attitude toward safety (Abdelhamid & Everett, 2000). Despite the lack of safety trainings in the University, it is noteworthy to mention that CPDO personnel underwent several safety trainings outside the University, as required by the nature of their work. Despite the lack of training for teaching and non-teaching employees, laboratory custodians assigned at the ECE/ Physics laboratory and Central Supply Room, which caters to chemistry and allied medical courses laboratories, shared that they initiated annual safety trainings for student assistants assigned at the said areas.

First aid facilities

In the case of the non-teaching employees of the University, the HIGH level of hazard revealed in the survey implies that there was lack of accessible and adequate first aid facilities in most offices and work areas. There was also a lack of awareness on emergency contact numbers among them. Occupational Safety and Health Administration (2006) defines emergency as an unexpected, serious occurrence resulting in injury or illness requiring immediate attention. First aid is emergency care provided for injury or sudden illness before emergency medical treatment is available. From the retrieved questionnaires, it was noted that some respondents did not accomplish the part on "FIRST AID" because as commented, first aid cabinets were not available in their work area. According to the Occupational Safety and Health Service of the Department of Labour of Wellington New Zealand (2001), first aid kits should be located to be clearly visible and accessible to all employees and be unlocked wherever possible. Sealed emergency kits should be available where it is imperative that kits are locked. Each employer

shall provide at least one full basic first aid kit in each place of work. All employees should be provided with a practical instruction like first aid facilities in the workplace, the location of first aid kits, the names and location of first aid personnel, and procedures to be followed when first aid is required.

Table 8

Comparison of the Mean level of Physical Hazard Associated with the Availability of First Aid Facilities using t-test

Employee	N	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.75	High	0.83	2 212	.002
Teaching	109	2.37	Moderate	0.85	-3.213	

Another evidence to support the result of the current survey would be the random interviews conducted by the OSH officers in 2013 with a few students, faculty and staff. Their responses during emergencies and safety issues demonstrated lack of awareness for emergency contact numbers, muster assembly points, use of fire extinguishers and fire safety, and security concerns. While emergency contact details were newly posted, only 3 out of 10 participants for the random interview knew the emergency contact number of the university. While the University has issued a Safety Measure Handbook and Security Manual, none of the interviewed faculty, staff and students were aware receiving a copy of such, and its contents (Saong, 2013).

The type of work performed will influence the hazards and the possible harmful consequences for employees. For example, employees in an office will have first aid requirements different from those in a manufacturing plant. Workplaces using hazardous substances may require specialized first aid facilities, such as eyewash stations and emergency showers (New South Wales Government, 2001). Three (3) of the 95

non-teaching respondents were laboratory custodians. One specifically was assigned at the CSR or as described by the OSH officers, the Central Supply Storage for Hazardous Materials. Because of the nature of the work at the said area, it requires specialized first aid facilities, such as eyewash stations and emergency showers. In 2013, it was observed that there were no safety showers, emergency spill kit, emergency response procedure and emergency clean-up procedure specific for chemical spill and leaks located in the room. Informal interview with the laboratory custodian and as observed by the researcher, such concerns were already addressed by the University. As further confirmed by another laboratory custodian, first aid cabinets are readily available in the work area. Despite the provisions of first aid facilities in laboratories, there was a lack of such in most offices and work areas for non-teaching personnel, thus posing a HIGH level of hazard to this group in general.

In the case of teaching employees, they were exposed to a MODERATE degree of hazard compared to the non-teaching employees who were exposed to a HIGH degree of hazard, as shown in Table 8. t-test would prove that there was a significant difference in the mean level of hazard between the two groups (p<0.05). This can be attributed to the fact that although some faculty rooms were not equipped with first aid cabinets, around 40% of the teaching respondents were handling laboratory subjects, and as confirmed by the laboratory custodians, laboratory rooms were equipped with first aid cabinets. Despite this though, teaching employees observed that there were inadequate stocks of first aid materials in the faculty rooms and classrooms. As further confirmed during informal interviews with some School secretaries, there are no first aid cabinets in Dean's offices and faculty rooms.

Lighting

Table 9 shows that over-all, non-teaching and teaching employees were exposed to a MODERATE degree of hazard associated with lighting

fixtures in the University. T-Test proved that there was no significant difference in the mean level of hazard between the two groups. Despite the MODERATE level in terms of the overall mean, one item in the questionnaire indicates that non-teaching employees were exposed to a LOW level of physical hazard since sufficient lighting for the performance of tasks were always provided by the University, whereas such provision was only frequently observed by the teaching employees, thus posing a MODERATE degree of hazard. Offices require sufficient light to enable work to be undertaken without risks to the occupants. These are standards contained in Health and Safety Executive (HSE) publications that offer guidance to the lighting levels in workplace environments. The provision of adequate light can be by natural or artificial means. The quality of light is essential, and a mixture of good natural light and artificial systems is the best method of providing the correct lighting level (Manchester Metropolitan University, 2006). Another item in the questionnaire revealed that both groups were able to control incoming natural light in their work area, thus posing only a MODERATE degree of hazard. Evidence would be the installed blinds in most offices and curtains in faculty rooms, classrooms, and laboratory rooms. Table 9

Comparison of the Mean level of Physical Hazard Associated with Lighting using t-test

Employee	Ν	Mean	Descriptive Interpretation	SD	t-value	Significance level (2-tailed)
Non-Teaching	95	2.28	Moderate	0.50	0 270	.781
Teaching	109	2.30	Moderate	0.48	-0.279	

Artificial lighting which caused reflection from work surfaces or shadows over the task, posed a HIGH degree of hazard to both groups as further revealed in the survey. Open-ended questions revealed that most of the office workers and some teaching employees spent several hours a day in front of display screen equipment (DSE). Display Screen Equipment (DSE) is sometimes referred to as Visual Display Units (VDU) or Computer Workstations and includes laptops, touch-screens, and other similar devices that incorporate a display screen. Any item of computer-related equipment including the computer, display, keyboard, mouse, desk, and chair can be considered part of the DSE workstation (Healthy Working Lives, 2013). A safety handbook by Manchester Metropolitan University (2006) highlights that it is also important that the direction of natural and artificial light must be controlled to ensure an absence of reflections on the display screen equipment (DSE). Since many employees in this study spent several hours a day in front of the computers wherein artificial lighting frequently caused reflection on DSE, most of them find they had tired, sore or irritated eyes at the end of a day. The condition might also be heightened by the lack of fresh air in the work areas as previously discussed.

Conclusion and Recommendations

The study provides evidence that University of Baguio employees were exposed to a varied type of physical hazards ranging from MODERATE to HIGH. Furthermore, the nature of work was recognized to be a significant factor contributing to the level of hazards encountered by the employees. As further implied from the result of this study, reduction of identified physical hazards and maintenance of a safe and healthy workplace necessitates strong management commitment and strong employee participation.

Based on the results of the study, the following are recommended by the researchers

- 1. In relation to specific areas which posed a high degree of hazard, the following must be undertaken:
 - a. Minimize the use of extension cords in the University by the installation of additional electrical outlets in the

offices, faculty rooms, classrooms and laboratory rooms. Electrical cords and connections must also regularly inspected by the Electrical department of the University.

- b. Install soundproof materials in offices located in the gym area to control or reduce noise.
- c. Indoor quality must be improved through natural and artificial ventilation. This can be achieved through the maintenance of windows to allow the flow of natural ventilation and installation of exhaust fans in areas where needed.
- d. Provision of accessible and adequate supply of first aid materials in all work areas in the University.
- e. Proper lighting and anti-glare filters should be installed to prevent glare from the VDU screens. VDU's should be placed in the workspace in such a way as to minimize or diminish glare.
- 2. The limitations of this study suggest further researches to investigate the effect of the identified hazard to the health of the employees.
- 3. The results of this study shall be disseminated to the respondents through a public lecture or seminar to be organized by the Research and Development Center of the University. Names of the participants shall not be mentioned during the presentation of results only generalization and recommendations shall be known.

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Effect of demographic profiles on the factors affecting the teachers reasons to integrate technology

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Abstract

Previous studies on educational technology integration for teaching indicated that the following factors influence a teachers' decision to integrate technology into classroom teaching: 1. facilitative use of technology in learning (FTL), 2. students' perception of teachers who use technology (SP), 3. use of technology in experimentation and simulation (ES), 4. use of technology for visualization and observation (VO), 5. overcoming difficulties in teaching (ODT), 6.school requirement (SR), 7. for teachers convenience in teaching (TC), 8. for good evaluation of teachers (GE), and 9. for use in class organization and management (COM). The study determined the level of importance that the teachers assign to the factors and investigated the effect of their demographic profiles unto the different factor constructs (age, teaching experience, gender, educational level). Results showed that teachers find it most important to adopt technology for class organization and management (COM), in using technology for visualization and observation (VO), and for facilitating learning (FTL) implying their pragmatic preferences for using technology. Only the model

for SP was found to be statistically significant using multiple regression analysis. Age was seen to be a significant predictor for FTL. However, there was a marked descending trend of the respondents' mean scores for FTL considering the respondents' age corroborating earlier findings on the association between technology adoption and the teachers' age and Educational Level (Master) was found to be a significant predictor for SR which is due to the effect of institutional and governmental policies, age, teaching experience, and training. Results further indicate that teachers also tend to give importance to adopting technology for good evaluation.

KEYWORDS: TECHNOLOGY INTEGRATION, TEACHING WITH TECHNOLOGY, DEMOGRAPHIC PROFILE, MULTIPLE REGRESSION ANALYSIS, MODELING

Introduction

s the world becomes globally integrative and more competitive, one edge the university can give to its graduates in their respective fields is being up-to-date and proficient in the use of computing and technological devices. A technology-based instruction and curriculum and a technology-abled academic body can achieve this competitive edge (Hafalla, 2017). Because of this, the adoption of novel and rapidly evolving technologies within schools has placed new demands on classroom teachers, who must learn to use new tools and develop technology-integrated lessons that support the development of students' 21st-century skills (Hutchison & Reinking, 2011).

The development of 21st-century skills of students necessitates 21st-century educators. According to the Partnership for 21st Century Skills (2009), "an excellent 21st century educator is one who is cognizant of the rapidly changing technology trends and is able to apply those

trends to the educational setting in a manner that will ensure students are not left behind in the wake of progress and have the necessary skills to compete in the global world". This implies that teachers need to be at par with global standards and must be adept and have the necessary knowledge in using educational technologies for teaching.

Recently, technological, pedagogical content knowledge (TPACK) has been studied to understand what knowledge and skills teachers lack and what professional development should be designed in order to systemically improve effective use of technology in classroom teaching (Koehler, Shin, & Mishra, 2012; Koehler, Mishra, Bouck, DeSchryver, Kereluik, Shin & Wolf, 2011; Koehler & Mishra, 2009; Mishra & Koehler, 2006). Some researchers argued that teachers' integrative knowledge of technology, pedagogy, and content that goes beyond specific technology skills should be given importance in teacher development (Niess, 2005; Polly, McGee, & Sullivan, 2010). While teachers' TPACK is a strong paradigm for effective technology integration, still, this does not explain why some teachers with sufficient knowledge utilize technology differently than others. For example, some use an interactive whiteboard only to project content while others use the board to support interactive student inquiry processes (Hall, 2010).

Research literature usually discusses two sets of barriers in an attempt to understand why technology is differently (or not at all) integrated into teaching among teachers who are equipped with the relevant knowledge. Pelgrum (2001) found in his study that the obstacles to using technology in teaching are somewhat complex, consisting of a mixture of material and non-material conditions. Also, according to Ertmer (1999, 2005) and Hew and Brush (2007), these include: (a) first-order barriers such as environmental readiness (e.g., computers, internet access) and teacher knowledge (i.e., TPACK); and (b) secondorder barriers which include factors such as teachers' beliefs (Ertmer, 1999, 2005; Hew & Brush, 2007). Second-order barriers, defined as

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the intrinsic factors that hinder technology integration, can interfere with teachers' technology integration even when first-order barriers are overcome (Ertmer, 1999). Further, Balanskat, Blamire, and Kefalla (2007) identified teacher-level, school-level and system-level factors that prevent teachers from integrating technology (ICT). Buabeng-Andoh (2012) also found in his literature review that lack of teacher ICT skills, lack of teacher confidence, lack of pedagogical teacher training, lack of suitable educational software, limited access to ICT, rigid structure of traditional education systems and restrictive curricula are all factors which prevent technology adoption/integration by the teachers.

Results from Bransford, Brown and Cocking's (2000) study indicated that enhancing the teaching/learning experience in the class makes teachers want to adopt technology in their curriculum. This result is further corroborated by Baek et al.'s (2008) study which identified the following reasons:

- 1. adapting to external requests and others' expectations,
- 2. deriving attention,
- 3. using the basic functions of technology,
- 4. relieving physical fatigue,
- 5. class preparation and management, and
- 6. using the enhanced functions of technology.

According to them, these factors do not correspond to the common sense theory of instructional technology. They cited that "although the majority of teachers intend to use technology to support teaching and learning, experienced teachers decide to use technology involuntarily in response to external forces while teachers with little experience are more likely to use it on their own will." Further, Baek et al. (2008) found that teachers generally decide to adopt technology to meet educational policies and mandates, students' and parents' expectations, and because of the basic merits of digitalized media. Also, Buckenmeyer (2010) found that professional development and available resources were significantly related to teachers' technology adoption decisions.

Recently, studies on the teachers' reasons to integrate technology into their teaching found the following factors (Hafalla, 2018):

- 1. Facilitative use of technology in learning (FTL),
- 2. Students' perception of teachers who use technology (SP),
- 3. Use of technology in experimentation and simulation (ES),
- 4. Use of technology for visualization and observation (VO),
- 5. Overcoming difficulties in teaching (ODT),
- 6. School requirement (SR),
- 7. For teachers convenience in teaching (TC),
- 8. For good evaluation of teachers (GE), and
- 9. For use in class organization and management (COM).

The results suggest that teachers most often adopt technology in their class first and foremost for facilitating learning and the least is for class organization and management. These factors indicate that teachers usually use technology in their class in a variety of ways to overcome their difficulties and shortcomings in teaching, to enhance the teaching and learning experience and to conform to expectations of the students and mandates by the school administration. Parallel results from the literature indicate that teachers' integration of technology (ICT) into teaching is influenced by organizational factors, attitudes towards technology and other factors (Chen, 2008; Tondeur, van Braak & Valcke, 2008; Lim & Chai, 2008; Clausen, 2007). This is further corroborated by Lam's (2000) study where he indicated that more confident teachers use technology as an instructional tool "to enhance students' learning."

According to Schiller (2003), personal characteristics such as educational level, age, gender, educational experience, experience with the technology (computer) for educational purposes and attitude towards



technology (computers) can influence the adoption of technology by teachers. With this in mind, the study assesses the level of importance that the teachers assign to the different factor constructs for the teachers reasons in integrating technology into their teaching and determine the effect of their demographic profiles (age, teaching experience, gender, educational level).

Methodology

The study is a descriptive-quantitative research on the teachers' reasons for adopting technology in classroom teaching using a five point Likert-type survey questionnaire administered to 139 respondents from the different schools of the University of Baguio during the 2nd SEM of SY. 2016-2017. Weighted mean was used to determine the mean level of importance that the teachers assign to the different factors while multiple regression analysis was used to determine the effect of the variables age, teaching experience, gender, and educational level unto the different factors.

Results and Discussion

Level of Importance of the Factors and their Indicators

Results from Table 1 indicate that teachers find it most important to adopt technology in Factor 9: class organization and management (COM) (M=4.08, SD=0.8399), followed by Factor 4: using technology for visualization and observation (VO) (M=4.01, SD=0.8977) and Factor 1: facilitating learning (FTL) (M=4.00, SD=0.8652). These factors indicate that teachers tend to give a premium on their ability to use technology in teaching (self-efficacy: Liaw, Huang and Chen, 2007; Yuen & Ma, 2008). However, the reverse is

true for factors "2. Students' perception of teachers who use technology" (M=3.31, SD=1.2010), "6. School requirement" (M=3.41, SD=1.0737), and "8. For good evaluation of teachers" (M=3.38, SD=1.1334) which all garnered the lowest mean level of importance. These results suggest that teachers tend to adopt technology in their class with lesser emphasis on students' perception of them or whether it is a school requirement or for good evaluations. They tend to use technology because it eases their work in managing and organizing their class, because they can use it for visualization, and because they can use it to facilitate learning. These reasons coincide with Baek et al.'s (2008) results that most teachers tend to adopt technology in class for their "convenience." Further, results of the study were also seen in Hafalla's (2017) study. He found that most of the in-service Mathematics educators integrate educational technologies into their teaching for convenience purposes such as for "easier presentation of problems and solutions," in "being organized," "simplifying the work of the teacher" and "faster and easier way of accomplishing their job."

Table 1

Mean level of importance of the factors

Factors	Mean	Std. Deviation	Descriptive Interpretation
1. FTL	4.00	0.8652	Highly Important
2. SP	3.31	1.2010	Moderately Important
3. ES	3.76	0.9748	Highly Important
4. VO	4.01	0.8977	Highly Important
5. ODT	3.69	1.0371	Highly Important
6. SR	3.41	1.0737	Moderately Important
7. TC	3.93	0.9783	Highly Important
8. GE	3.38	1.1334	Moderately Important
9. COM	4.08	0.8399	Highly Important

Table 2 specifies the mean level of importance of the indicators

(variables) of the different factor constructs.

Table 2

Mean level of importance of the indicators of the different factors

	Indicators	Mean	Std.	Descriptive Interpretation
Fac	tor 1. FTL			
1.	Technology facilitates students' self- directed learning	4.09	0.8058	Highly Important
2.	It is effective for helping students concentrate on a lecture	3.83	0.9397	Highly Important
3.	When I teach unfamiliar contents, technology helps me in understanding them	4.14	0.8036	Highly Important
4.	A lot of educational software is available for free on the internet	3.91	0.9547	Highly Important
5.	Prepared lecture materials using technology can be reused again and again in the future	4.16	0.7826	Highly Important
6.	Using technological manipulatives make the students more interested in class	4.06	0.8359	Highly Important
7.	Technology delivers the course content clearly to the students	3.80	0.9339	Highly Important
Fac	tor 2. SP			
1.	Student believe that I am an expert on the topic when I use technology	3.35	1.2201	Moderately Important
2.	Students believe that I am a professional teacher when I use technology in class	3.30	1.1957	Moderately Important
3.	Students believe that I prepared well for the class when I use technology	3.45	1.1867	Moderately Important
4.	Students regard teachers who use technology as "cool teachers"	3.29	1.2291	Moderately Important
5.	It is a common perception that good teachers use technology well	3.35	1.1663	Moderately Important
6.	Students regard teachers who use technology as "serious" teachers	3.11	1.208	Moderately Important

Factor 3. ES

1.	Using technology in class provides a feedback mechanism for the teaching and learning experience	3.94	0.8578	Highly Important
2.	It is possible to do experiments that are too difficult to do in the regular classroom	3.64	1.0589	Highly Important
3.	Technology provides safety to students experiments	3.57	1.0429	Highly Important
4.	Technology provides simulations before the actual experiment or activity	3.88	0.9394	Highly Important
Fac	tor 4. VO			
1.	Through video recording, students have opportunities to reflect on their behavior during their activities	4.04	0.8961	Highly Important
2.	Through video recording, students have opportunities to observe themselves during their activities	4.06	0.8233	Highly Important
3.	Through video recording, students have opportunities to revisit and re- evaluate their procedures during their activities	4.06	0.8609	Highly Important
4.	Routine work such as reporting a student's demographic information or managing results of evaluation is done using the computers	3.88	1.0105	Highly Important
Fac	tor 5. ODT			
1.	Technology is effective for explaining complicated theories or solving difficult problems	3.71	1.0663	Highly Important
2.	Technology is most useful when very complicated subjects are taught	3.91	1.0528	Highly Important
3.	Technology can compensate for my shortcomings in teaching	3.22	1.1839	Moderately Important
4.	Technology provides various evaluation methods for student work	3.90	0.8452	Highly Important
Fac	tor 6. SR			
1.	It is required by the subject	3.36	1.0633	Moderately Important



2.	It is required by the syllabus/ curriculum	3.46	1.0679	Moderately Important
3.	My school head/s encourages the use of technology	3.66	1.0602	Highly Important
4.	It is required by the guide-book/ manual/textbook	3.17	1.1032	Moderately Important
Fac	tor 7. TC			
1.	Technology increases communication between teachers and students or parents through the school web site and Internet community	3.89	1.005	Highly Important
2.	Using technology facilitates difficult and time-consuming computations	3.84	1.0304	Highly Important
3.	Many teaching aids use software or other technology	3.91	0.9239	Highly Important
4.	It simplifies my searching and preparing for the subject's material	4.06	0.9538	Highly Important
Fac	tor 8. GE			
1.	My school head requests using technology to get good evaluations	3.24	1.1137	Moderately Important
2.	It is required in the evaluation of teachers by the students	3.62	1.1291	Highly Important
3.	Students demand the use of technology to get good evaluations in class	3.28	1.1574	Moderately Important
Fac	tor 9. COM			
1.	It is a convenient way to organize lecture content or material	4.12	0.826	Highly Important
2.	It is easier to share information or files with other teachers	4.15	0.8674	Highly Important
3.	It makes reusing of the organized lecture content or material possible	4.14	0.853	Highly Important
4.	It makes sharing of pictures, movie- clips or other files with students easier	4.04	0.8502	Highly Important
5.	It saves time when students reports or other requirements are submitted through email or web-board	3.98	0.8028	Highly Important

Results from Table 2 specifies that most of the indicators have "moderately important" to "highly important" mean importance levels. For the factor "9. For use in class organization and management", we find that the indicator "It is easier to share information or files with other teachers" (M=4.15, SD=0.8674) has the highest mean value. Also, for factor "4. Use of technology for visualization and observation", the indicator "Through video recording, students have opportunities to observe themselves during their activities" (M=4.06, SD=0.8233) and "Through video recording, students have opportunities to revisit and reevaluate their procedures during their activities" (M=4.06, SD=0.8609) both have the highest mean level of importance. These results indicate that teachers tend to use technology to help students realize their mistakes and correct them. These reasons are trademarks of self-directed learning of Knowles, experiential learning of Dewey and constructivist teaching and learning and social learning theory of Piaget and Vygotsky (Overbay, Patterson, Vasu, & Grable, 2010; Ertmer, 2005; Levin & Wadmany, 2008; Ertmer & Ottenbreit-Leftwich, 2013; Liu, 2011). Miller (2008) cited that the digital video composing feature of computers "can provide rich opportunities for students to learn curricular concepts deeply as they draw on tacit knowledge of media, connect curriculum to their lives through embodied experience, learn multimodal design, and create new identities as designers and active learners." Further, results from Table 2 show that for the factor "1. Facilitative use of technology in learning", we find that "Prepared lecture materials using technology can be reused again and again in the future" has the highest mean value (M=4.16, SD=0.7862). This result is indicative of the fact that teachers tend to use technology for their "own convenience" in class lecture and preparation by reusing the materials they prepared (i.e., powerpoint, video recording, slides, manipulatives) for the next class or term (Baek et al., 2008). Also, it is noteworthy to mention that teachers tend to give less importance to the indicators of factor "2. Students' perception of teachers who use technology" where all of the indicators have "moderately important" levels.

Effect of Gender, Age, Teaching Experience and Educational level unto the Different Factor Constructs

Multiple regression analysis was done with the factor scores of the respondents as the dependent variable to see the effect of the moderator variables (age, gender, teaching experience, educational level) to the different derived factor constructs. Dummy coding for the variables GENDER and highest educational attainment (C1: BACHELOR, C2: MASTER) was used. Results of the multiple regression analysis are found in Table 3.

As seen in Table 3, most of the regression models derived were not significant except for the model for SP (Students' perception of teachers who use technology) (p < 0.05). This outcome suggests that the derived model significantly predict the respondents' factor score on SP better than its mean. However, additional inspection of the predictor variables indicates that none of them were significant predictors. Further scrutiny of all the predictor variables also shows that except for a few predictors, most are non-significant predictors.

AGE, in the model for Factor 1 (Facilitative Use of Technology in Learning (FTL)), is seen to be a significant predictor of FTL (p < 0.05). Its coefficient value of -0.026, however, indicates that as teachers gain an age of one year holding the effects of all the other predictor variables at bay, their factor score for FTL loses 0.026 points suggestive of an inverse relationship. This trend is further elucidated when one examines the mean of the factor score for FTL considering the respondent's age bracket in Figure 1.

Table 3

Results of multiple regression analysis

Dependent Variable	Predictor	Unstandardized Coefficients			Model		
(Factor Scores)	variables	b _i t p-v		p-value	r²	f	p-value
1. FTL	Constant (b _o)	0.517	1.045	0.298	0.059	1.653	0.15
	Gender	0.303	1.697	0.092			
	Age	-0.026	-2.008	0.047*			
	Years of teaching	0.014	0.840	0.402			
	C1: bachelor	0.193	0.624	0.534			
	C2: master	0.226	0.853	0.395			
2. SP	Constant	0.292	0.598	0.551	0.079	2.282	0.05*
	Gender	-0.217	-1.226	0.222			
	Age	-0.009	-0.679	0.499			
	Years of teaching	-0.018	-1.100	0.273			
	C1: bachelor	0.271	0.883	0.379			
	C2: master	0.335	1.279	0.203			
3. ES	Constant	0.046	0.091	0.928	0.030	0.815	0.541
	Gender	0.087	0.48	0.632			
	Age	-0.003	-0.258	0.797			
	Years of teaching	0.019	1.138	0.257			
	C1: bachelor	-0.173	-0.548	0.584			
	C2: master	-0.132	-0.492	0.624			
4. VO	Constant	-0.268	-0.532	0.596	0.021	0.563	0.728
	Gender	0.241	1.322	0.188			
	Age	-0.003	-0.228	0.820			
	Years of teaching	0.007	0.443	0.658			
	C1: bachelor	0.263	0.831	0.407			
	C2: master	0.257	0.951	0.343			
	Constant	-0.068	-0.136	0.892	0.021	0.564	0.728
	Gender	0.127	0.697	0.487			
	Age	-0.002	-0.162	0.872			
	Years of teaching	0.012	0.704	0.483			
	C1: bachelor	0.147	0.465	0.643			
	C2: master	-0.185	-0.685	0.495			
i. SR	Constant	0.057	0.115	0.909	0.059	1.676	0.145
	Gender	-0.085	-0.478	0.634			
	Age	-0.003	-0.253	0.801			
	Years of teaching	-0.012	-0.715	0.476			
	C1: bachelor	-0.034	-0.109	0.914			
	C2: master	0.524	1.981	0.050*			

7. TC	Constant	-0.566	-1.127	0.262	0.028	0.774	0.57
	Gender	-0.254	-1.398	0.164			
	Age	0.014	1.049	0.296			
	Years of teaching	-0.003	-0.154	0.878			
	C1: bachelor	0.334	1.059	0.292			
	C2: master	0.077	0.284	0.777			
8. GE	Constant	1.023	2.051	0.042*	0.042	1.161	0.332
	Gender	-0.068	-0.379	0.706			
	Age	-0.026	-1.914	0.058			
	Years of teaching	0.001	0.051	0.959			
	C1: bachelor	-0.279	-0.892	0.374			
	C2: master	0.031	0.117	0.907			
	Constant	0.839	1.671	0.097	0.029	0.802	0.55
	Gender	0.107	0.59	0.556			
	Age	-0.022	-1.609	0.11			
	Years of teaching	0.005	0.293	0.77			
	C1: bachelor	-0.346	-1.097	0.274			
	C2: master	-0.019	-0.072	0.943			

*Significant at the 0.05 level



Figure 1. Mean of factor scores on FTL considering the respondents' age

Figure 1 illustrates the descending trend of the respondents' mean factor scores for FTL as their age bracket progresses. Results

indicate that teachers tend to "soften" the degree of importance they give to the use of technology for teaching as they age maybe because of the fast-paced evolution of technology where they fail to update themselves on current trends or from their lack of training or interest thereof. Some studies have found that, generally, demographics, such as teaching experience and age, have a negative impact on computer anxiety (Aldunate & Nussbaum, 2013). This result underscores the necessity of teachers to be continuously trained and updated on current trends in educational technologies either through in-school seminars or trainings or on more formal trainings outside the school. Results also conform to Baek et al.'s (2008) study where they found that the teachers' age has a negative impact on their factor scores for "using the enhanced functions of technology." They established that although the majority of teachers intend to use technology to support teaching and learning, older teachers with more teaching experience decide to use technology involuntarily in response to external forces while younger teachers with little teaching experience are more likely to use it on their own will. Further, Yaghi (2001) found in his study that mostly older in-service teachers were less confident with using computers while Lee and Tsai (2010) also found that older Taiwanese in-service teachers are less confident in their TPACK perceptions for using web-based technologies.

Another significant predictor is MASTER in the regression model for Factor 6 (School Requirement (SR) (p < 0.05). Interpreting this, a teacher gains 0.524 points on the factor score for SR as he attains a master's degree holding the effects of the other predictor variables constant. This result means that the teacher assigns more importance to adopt technology in class as a school requirement as he attains a master's degree as compared to a doctoral degree. This finding suggests that the motivations for adopting technology in class why it is so manifested for the master's group is maybe due to institutional or governmental policies (CHED). This result may suggest that teachers tend to give importance to technology adoption more as they gain additional knowledge through

their masters' degrees but not from their bachelor and doctoral degrees. This result is further indicative of the progress of most teachers in technology integration that as he/she matures, technology integration and the drive to learn new technologies mellow down. As seen in Schiller's (2003) study, personal characteristics such as educational level and educational experience, among others, can influence the adoption of technology by the teachers. This effect can be seen in the means plot for the factor score for SR comparing the respondents' highest educational attainment (Figure 2).



Figure 2. Means plot of the respondents' factor score for SR comparing their highest educational attainment

For the doctoral group, this enigma is maybe due to the effect of AGE on the respondents' use of technology as explained in previous discussions. For the bachelors group, which consists mostly of new and beginning teachers, studies have shown that while they may have higher technology knowledge, they lack the pedagogical and content knowledge to teaching to effectively integrate technology (OttenbreitLeftwich, Glazewski, Newby & Ertmer, 2012; Pamuk, 2012; Jang & Chen, 2010; Firek, 2003; Becker, 2009). Also, it was observed that many beginning teachers do not have the necessary knowledge or experience to incorporate educational technologies in their teaching (Buckenmeyer & Freitas, 2005; Niess 2005). Further, most young teachers lack educational technology support and training where teachers who are provided training and then continued support after training, have significantly higher self-efficacy, or confidence, to integrate technology and use technology for learning than those who have not participated in training sessions (Levin & Wadmany, 2008). Research literature further cites that the primary reason for their insufficient skills in using educational technologies is their lack of teacher training (Koehler, Mishra, & Yahya, 2007; Angeli & Valanides, 2005).

The CONSTANT in the model for GE (Good evaluation) is seen to be statistically significant (p > 0.05). This result suggests that teachers to some extent also tend to give importance to adopting technology in class for good evaluation by their respective heads, deans and the students, which are hallmarks of good educational practice (Baek et al., 2008). This stems from the fact that teachers are reflective, rational practitioners whose technology adoption decisions result from their thoughtful consideration of the consequences of their actions, the social support they have, and the resources available to them (Sugar, Crawley & Fine, 2004). Hence, the teachers' decision in putting importance to adopting technology in their teaching is hinged from the expected consequences of their action which in this instance is "good evaluation" as described by the expectancy-value theory. The foundation of personal attitude (to adopt technology in teaching) lies in the salient personal beliefs (i.e., it can give good evaluation) held by an individual about the outcome of engaging in a specific behavior, each belief weighted by the extent to which the person values the particular outcome (Sugar, Crawley & Fine, 2004). However, scrutiny of the indicators for GE in Table 6 indicate that respondents mostly give "moderate importance" to its indicators.

Conclusions

Results from the study suggest that teachers find it most important to adopt technology first and foremost for class organization and management (COM) followed by using technology for visualization and observation (VO) and facilitating learning (FTL) which indicated their pragmatic preferences for using technology. Teachers tend to adopt technology in their class with lesser emphasis on students' perception of them or whether it is a school requirement or for good evaluations. Implications of these results point to the fact that teachers tend to view technology as a utility tool which can help them in their teaching. Only the model for Factor 2 (Students' perception of teachers who use technology (SP)) was found to be significant using multiple regression analysis. However, none of its predictor variables (age, gender, highest educational attainment, and years of teaching experience) were deemed significant. AGE, in the model for Factor 1 (Facilitative use of technology in learning (FTL)) was seen to be a significant predictor of FTL. However, there was a marked descending trend of the respondents' mean factor score for FTL considering the respondent's AGE indicative of the fact that teachers tend to give less importance to using technology as they age highlighting the necessity of teachers to be continuously trained and updated on current trends in educational technologies. Educational level (MASTER) in the regression model for Factor 6 (SR) was also seen to be a significant predictor of SR. Teachers assign more importance to adopt technology in class as a school requirement as he attains a master's degree as compared to a bachelor's or a doctoral degree. This finding is maybe due to the effect of institutional or governmental policies, age, teaching experience and trainings in educational technologies. The result emphasized the necessity of re-orienting teachers in the bachelor and doctoral level in technology integration for teaching. The CONSTANT in the model for Factor 8 (Good evaluation (GE)) was also seen to be a significant predictor demonstrating that teachers also tend to give importance to adopting technology in class for good evaluation by their respective heads, deans and the students, which are hallmarks of good educational practice. This result is validated, to a lesser extent, by the value-expectancy theory. However, scrutiny of the indicators for this factor shows that the respondents' only give "moderate importance" to most of its indicators.

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Developing a youth health framework for the University of Baguio Freshmen

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ABSTRACT

This paper aimed to develop a youth health framework founded on the health-related behavior status among first-year college students in the University of Baguio in the school year 2014 to 2015 using a questionnaire from the Youth Risk Behavior Surveillance System. Specifically, the study surveyed the extent to which the freshmen engage in health risk behavior along behaviors that contribute to unintentional injuries and violence; sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection; tobacco and drug use; alcohol use; unhealthy dietary behaviors; and inadequate physical activity, including their perceived consequences. T-test and Analysis of Variance

were used to determine significant differences in health risk behaviors along gender and program, respectively. Overall, the extent of health risk behavior among first-year students were interpreted as non-risky/very healthy (M=1.79). There were significant differences (p=.000<0.05) in the extent of health risk behavior among the respondents along gender and program of choice in behaviors that contribute to unintentional injuries and violence, alcohol use, and inadequate physical activity. Meanwhile, sexual behaviors; tobacco and drug use; and unhealthy dietary behaviors (p>0.05) show that the differences among the program of choice of UB first-year students were not statistically significant. Furthermore, there is still a need to increase the extent of awareness on the negative health effects of all areas of health risk behaviors covered in this study, with lifestyle factors, specifically diet and exercise, as the major concern when dealing with the health status UB freshmen.

KEYWORDS: MEDICAL EDUCATION, YOUTH HEALTH, HEALTH RISK BEHAVIOR, DESCRIPTIVE-STATUS, UNIVERSITY OF BAGUIO

Introduction

ealth is personal. It is an individual's responsibility to one's self. Though parents and legal guardians take the responsibility of looking after children's health, as children grow older, it is essential that they take responsibility for their own health (Galvez-Tan, Vicencio, Abubakar, Baquiran, Parawan, Reyes, & Ang-See, 2009). Adolescents establish patterns of behavior and make lifestyle choices that affect both their current and future health. Serious health and safety issues such as motor vehicle crashes, violence, substance abuse, and risky sexual behaviors can adversely affect adolescent and young adults (Center for Disease Control and Prevention, 2011). This long-awaited time when adolescents express their need for more freedom is also the time when parents start to worry about what their children may do that may adversely impact their future.

Risk-taking is often associated with middle adolescence. Adolescence is an appropriate time for trying new things and taking new risks with positive and negative consequences. Incidentally, adolescents have often been portrayed as taking extreme, ill-considered risks (Galvez-Tan et al., 2009). Being unable to maintain a healthy status hinders productivity which results to poor performance in school and eventually failing to finish their program.

We hypothesized that developing a youth health framework may prevent college freshmen of the University of Baguio in avoiding healthrisk behaviors in each of these six categories: (1) behaviors that contribute to unintentional injuries and violence; 2) tobacco use; 3) abuse of alcohol and other drugs; 4)risky sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases (STDs), including HIV infection; 5)unhealthy dietary behaviors; and 6) physical inactivity and obesity and asthma among youth and young adults (MMWR, 2012). This paper aimed to develop a youth health framework based on the status of health-related behavior among first-year college students at the University of Baguio during the school year 2014 to 2015. Such framework shall be used in designing programs that will fit into the social orientation provided by the University as part of the academic requirements of transferees and incoming first-year students.

Methodology

This is a descriptive study regarding the present health risk behaviors of the college freshmen in the University of Baguio.

The total enumeration was employed in the survey that comprises

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of enrolled first-year students in the University of Baguio during the first semester of SY 2014-15. The subjects were grouped according to gender. Distribution of the respondents according to program of choice was as follows: 471 Allied Medical Sciences (AMS), 746 International Hospitality and Tourism Management (IHTM), 304 Engineering and Architecture (EA), 170 Liberal Arts and Human Sciences (LAHS), 99 Teacher Education (TE), 303 Information Technology (IT), 435 Law Enforcement and Public Safety (LEPS), and 424 Business Administration and Accountancy (BAA).

Data were gathered in collaboration with the National Service Training Program (NSTP) office. Initially, letters to the NSTP coordinators of the different schools and the university director were furnished to seek permission for the distribution of the study's questionnaires. The NSTP facilitators were asked to administer the questionnaires to the first year students. Data collectors were given the guidelines on how to collect the data.

The extent of health risk behaviors was determined by getting the weighted and area mean for each group of respondents and for each category such as safety, violence, bullying, suicide, tobacco use, alcohol drinking, drug use, sexual behavior, body weight, diet, and physical activity to answer problem 1. Table 1 shows the interpretation for the weighted means.

Analysis of Variance (ANOVA) was used to determine significant differences among the program clusters while T-test was used to determine significant differences between genders.

Table 1

Interpretation for the Extent of Health Risk Behavior

Mean Range	Interpretation
4.20 - 5.00	Very risky/Very Unhealthy
3.40 - 4.19	Moderately risky/slightly healthy
2.60 - 3.39	Fairly risky/fairly healthy
1.80 - 2.59	Slightly risky/moderately healthy
0.00 - 1.79	Non risky/ very healthy

Before the questionnaires were distributed by the NSTP facilitator to his/her class, respondents were adequately informed of the purpose of the study as indicated in the cover letter of the questionnaire and that they will be duly informed of the results of the study. Furthermore, respondents were not asked to write their names on the survey questionnaire. The answers given were kept private. Completing the survey was voluntary, and therefore, the respondents were assured that whether or not they participate, their grades in class would not be affected. Data gathered were submitted by the data collectors to the researchers in sealed plastics, ensuring that the identity of the students was not divulged.

Results and Discussion

The extent to which the Freshmen in University of Baguio Engaged in Health Risk Behavior

Specific problem number one deals with the extent to which the freshmen in University of Baguio engaged in health risk behavior along the following areas: (a) behaviors that contribute to unintentional injuries and violence, (b) sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection, (c) tobacco and other drug use, (d) alcohol use, (e) unhealthy dietary

Moderately Healthy (MH). Further, the area mean of 1.24 shows that most of the UB freshmen students are aware of their behaviors towards

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behaviors, and (f) inadequate physical activity.

As shown in Table 2, the extent of health risk behavior among the freshmen of the University of Baguio in the SY 2014-2015 has an average mean of 1.79 which is non-risky (NR)/ very healthy (VH). This means that the freshmen in the University of Baguio have very healthy practices. However, they need to be directed towards proper health engagement on physical activity and dietary behavior.

Table 2

Extent to which the Freshmen in University of Baguio Engaged in Health Risk Behavior (N=2952)

Indicators		Mean Rating	Standard Deviation	Descriptive Interpretation
a.	Behaviours that contribute to unintentional injuries and violence	1.24	0.32	Non-Risky(NR) / Very Healthy (VH)
b.	Sexual behaviours that contribute to unintended pregnancy and sexually transmitted disease, including HIV infections	1.21	0.53	NR/ VH
c.	Tobacco and other drug use	1.07	0.22	NR/ VH
d.	Alcohol use	1.55	0.63	NR/ VH
e.	Unhealthy dietary behaviours	2.56	0.52	Slight risky (SL)/ Moderately Healthy (MH) Fairly risky (FR)/ Fairly
f.	Inadequate physical activity	3.08	0.66	Healthy(FH)
	Area Mean	1.79		Non-Risky(NR)/ Very Healthy (VH)

Behaviors that Contribute to Unintentional Injuries and Violence

Most of the behaviors are interpreted as Non-Risky (NR) or Very Healthy (VH), and two are interpreted as Slightly Risky (SR) or unintentional injuries. Thus, they have very healthy practices concerning preventing unintentional injuries and violence except that they have to improve in the use of the seatbelt in the car or other vehicles. Further, they should be more sensitive in riding a car or other vehicle driven by someone who had been drinking alcohol and texting or e-mailing while driving a car or other vehicle. These are indicators of safety, and the finding corroborates with the trends in the prevalence of behaviors that contribute to unintentional injury. The use of helmet, seatbelt and avoiding alcohol intake while driving shows a decreased contribution to the leading causes of death, disability, and social problems among youth and adults in the United States (National YRBS, 1991-2013). Moreover, findings are strengthened by the result of the study of Khallad (2010), as it is presented that Jordanian students were less likely than American students to buckle up, but American students were more likely to engage in vehicular speeding. With this, it was shown that if students practice the use of the seatbelt, it increases their confidence to increase speed and end up speeding. On suicidal tendencies, some students felt so sad and hopeless that they stopped doing usual activities (1.83/slightly risky). This indicator implies a moderately healthy behavior that can be observed when the students feel depressed. According to Remedy Health Media (2015), people with depression, however, often cannot explain the reason for becoming depressed, though they describe it as emotionally painful and saddening. The predominant symptoms of depression are a general loss of interest and energy, and an inability to experience pleasure which translates to the result of the study. Moreover, a person with depression typically withdraws from or becomes impaired in social interactions. Apathy toward work, school, relationships, responsibility, and eventually toward important goals, negatively affects the person and the family. The

economic cost is significant concerning lost hours, reduced productivity,

and health care. It was shown in another study that "mental health literacy

level was associated with mental health status" (Lam, 2014). The feeling

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of sadness could be addressed as the students learn more to understand what they are going through.

Sexual Behaviors that Contribute to Unintended Pregnancy and Sexually Transmitted Diseases, Including HIV Infection

Only one indicator was used to determine the extent of health risk behavior concerning sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection which is on sexual intercourse. At their age, the first year students are not expected among the Filipinos to have engaged in such behavior. Of the 2952 participants, the result gave an area mean of 1.21 which is interpreted as non-risky behavior leading the researchers to say that the youth in this study maintain very healthy sexual behaviors. National College Health Assessment also found out relatively low prevalence in risky sexual behavior at 12% (Kwan et al., 2013). Further study was made by looking into additional indicators of sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection that may shed light on the development of a youth health framework.

With the weighted mean of 1.34, the researchers noted that the propensity for sexual activity increased from age 12 to age 16 and above among those who admitted having engaged in sexual activity. The participants who answered this portion of the study also showed likeliness of engaging in sexual relations with only one partner as seen in the weighted mean of 1.27. In the study of Laska, Pasch, Lust, Story, and Ehlinger (2009) findings show that the emerging adults' ages 18-25 years old have 10.2% prevalence in sexual behaviors as being intoxicated during last sexual intercourse. Intoxication during sexual intercourse was not notable as the behavior of the UB students who answered this portion as manifested in the weighted mean of 1.12 who responded that they never drank alcoholic drink or used drugs before sexual activity. This rebounds to healthy sexual behaviours if at all engaged. Further, the study also shows that those who answered this portion of the questionnaire practiced the use of a condom with the weighted mean of 1.22 which would help to prevent sexually transmitted diseases. Likewise, with the weighted mean of 1.24 practiced the use of contraceptives to prevent pregnancy.

Tobacco and Other Drug Use

Most of the indicators including the area mean of 1.07 for tobacco and other drug use indicate that the UB freshmen students are engaged in non-risky behavior and are very healthy. Though most if not all students tried cigarette smoking, even one or two puffs, all other indicators show non-risky or very healthy behaviors concerning tobacco and other drug use. In the findings of Kwan et al., (2013), it shows that there is relatively low prevalence in smoking (13.1%), marijuana (17.5%) and other illicit drug use (3.6%). It was presented in the study of Hawaii Health that tobacco use, including cigarette and cigar smoking as well as smokeless tobacco use, is the leading preventable cause of death in the United States. Cigarette smoking accounts for approximately 1 of every five deaths each year or about 443,000 deaths in the United States each year. Some 3,600 young people between the ages of 12 and 17 start smoking each day, and another 1,100 young people progress from experimenting with cigarette use to becoming daily smokers. In 2007, 20% of high schools students reported current cigarette use (Hawai'i Health Data Warehouse, 2010). This phenomenon poses a problem as trying the vice once could mean working it again until it becomes a habit which would be difficult to eliminate. Unfortunately, there are more Filipino adolescents today who start smoking at a very early age compared to those teens 5 to 10 years ago (Cabigon, 2004). Fortunately, the suggestions of these related studies are not supported by the findings among first-year students in the University of Baguio who gave a mean (1.07) for the area on tobacco and other drugs use, which is interpreted as non-risky or very healthy.

Smoking-related indicators of health risk behavior were also studied. Of the respondents who answered the indicator which talks about smoking one stick in a day, 6.2% of them "always" which is equivalent to 20 or more times in their lifetime. The study reveals that most of those who tried smoking are not heavy smokers or that they have been attempting it either once or twice only in their lifetime (13.2%), or three to four times only (8.1%). Hence those who claim they never smoked one whole cigarette is 68.4%. The claim that those who tried smoking are not heavy smokers is further supported by findings when asked about smoking one pack of cigarette, with 85.3% who claimed they never did so and 2.3% claiming they always (20 times or more in the past) smoked one pack a day. The likelihood of still smoking one stick in a day or one stick in a day for 20 times or more in the past is shown to increase as the participants move from 12 years of age and below (1.6%), to 13 to 15 years old (4%) and 16 and up (8.5%). Consequently, those who never smoked one stick in a day decreases as one age as shown by the results from 12 and below (84.2%), to 13 to 15 years old (65.9%), and 16 and up (49.8%). The results further show that 43.1% of those who bought cigarettes bought it from a convenience store, supermarket, discount store or gas station. Using someone else's money (2.3%) and borrowing money (1.6%) to buy cigarettes is not a major concern among the participants of this study. A few participants rely on somebody 18 years old and above (4.3%) or taking a cigarette from a family member to have a cigarette (1.7%). This shows the critical role of adults and family members in the likelihood of smoking among the youth. Being the second parents of students, administrators, teachers, and staff of schools should also embrace their role in the prevention of smoking. Of the 302 who claimed that they tried smoking on school premises, one percent did it for 20 or more times. While 6.1% did it once or twice. There are 55.1% of those who answered this question in the study said they tried to quit smoking either always or 20 or more times in the past (28.9%), most of the time (9.0%), sometimes (8.9%), and rarely (6.1%). This indicates further reason to strengthen the campaign against smoking to

support those who want to quit. Incidentally, only 1.8 % says that they chew tobacco, snuff or dip always or 20 or more times.

Health or risk behaviors related to marijuana and other drugs use was also studied. The data shows that there is an increasing likelihood of engaging in the use of marijuana as the youth reaches older ages from age 12 and below (0.5%) to age 13 to 15 (1.3%) and to age 16 and above (3.1%). The chances of having acquired marijuana from their friends are who are 18 or younger than 18 (3.5%) is almost the same as those who are older than 18 (3.4%). The chances of acquiring marijuana for free or not was also almost the same. It is good to note that only 0.3% has been offered, sold, given illegal drug within school premises.

Alcohol Use

One indicator was used to determine the extent of health risk behavior concerning alcohol drinking. The study shows an area mean of 1.55 which is interpreted as non-risky or very healthy. The UB freshmen students have no risk in their alcohol use behavior. This means that they are very healthy concerning alcohol use. The finding corroborates with the study of Kwan et al. (2013) and Hawai'i Health Data Warehouse (2010)stating that the prevalence of binge drinking was much higher, with nearly 60% of students who were reported to be consuming greater than five alcoholic drinks in a single occasion during the last 15 days.

Other health risk indicators related to alcohol use were also studied. Data shows that there is not much difference in the number of those who consumed one glass (1.64) of alcoholic beverage and those who consumed more than one glass (1.62) in the past thirty days. For those whom this is true, they took alcoholic drinks at least 20 times or more in the past thirty days. Those who never consumed alcohol whether one glass or more than one glass in the past thirty days were much higher than those who did. In a previous study, 31% of college students met

criteria for a diagnosis of alcohol abuse and 6% for a diagnosis of alcohol dependence in the past 12 months, according to questionnaire-based self-reports about their drinking (NIH, 2013). This study also shows that it is more likely that students start to engage in alcohol drinking more as they age from 12 and below (1.19), 13 to 15 (1.51) and 16 and above (1.94). The most common source of alcoholic drink is a store such as a convenience store, supermarket, discount store, or gas station (1.64) for those who answered always. A concern that can be seen in the data is when a person 18 years old or older gave money to buy an alcoholic drink (1.62) for those who answered always. A person 18 or older than 18 is also the most common source of support for alcoholic drinking. A few (1.13) of those who answered took alcoholic drinks within the school premises in the past 30 days. Interestingly, almost all of those who drank alcoholic beverages (2952) tried to quit drinking (2.17) in the past 30 days.

Unhealthy Dietary Behaviors

The participants of the study are generally normal in weight. The area mean of 2.56 interpreted as slightly risky (SR) or moderately healthy (MH) suggests that the freshmen students need to improve their dietary behaviors. Data shows that freshmen students drink less of 100% fruit juices and eat less vegetable. Even less encouraging results from Biomed central shows that 88.5% of the student population consumed less than five servings of fruits and vegetables each day (Kwan et al., 2013).

Breakfast intake including milk is seen to be fairly risky. Though some would be unable to take a full breakfast sometimes or most of the time due to their hectic schedules as claimed by the students and based on the result, other indicators show that the students need to improve on dietary behaviors particularly in their food choices. Sound nutrition is instrumental in promoting overall health, maintaining a healthy weight, and ensuring optimal growth and development. Diets that are rich in fruits and vegetables to include calcium-rich foods, and limit low-nutrition snacks and sodas, reduce the risk of heart disease, cancer, stroke, and osteoporosis, among others (Hawai'i Health Data Warehouse, 2010). At school, a hungry child can lose concentration in class, lacks energy for playtime and snack on unhealthy foods, such as chips or biscuits. A calm and healthy breakfast every day is the best defense against this happening. It also helps children to get into good habits that they can carry through life (NSW Ministry of Health, 2015).

Inadequate Physical Activity

The area mean of 3.08 and most of the indicators are interpreted as fairly risky, which means that the UB freshmen students are fairly healthy. Thus, they need to improve their physical activities. The findings corroborate with the study of Biomed Central in which the results indicate that 72.2% of students were physically inactive and 75.6% were not getting enough sleep to be rested on greater than or equal to 4 nights each week (Kwan et al., 2013). In the study of Sawka, McCormack, Aguirre, Hawe, and Baker (2013), a higher level of physical activity among friends is associated with higher levels of physical activity of the individual.

Longitudinal studies reveal that an individual's level of physical activity changes to reflect his or her friends' higher level of physical activity. Group activities are therefore helpful in improving one's health practices, particularly concerning exercise.

In 2013, 27.1% of high school students surveyed had participated in at least 60 minutes per day of physical activity on all seven days before the survey, and only 29% attended physical education class daily (Center for Disease Control and Prevention, 2011). In lieu thereof, the 2005 Dietary Guidelines for Americans recommends that youth must engage in at least 60 minutes of physical activity on most, preferably all, days of the week. Previous guidelines recommended levels of physical

activity be at least 20 minutes of vigorous activity on 3 or more of the past seven days or at least 30 minutes of moderate physical activity on 5 or more of the past seven days (Hawaii Health, 2010). Belton, O'Brien, Meegan, Woods and Issartel (2014) further found out that majority of youth (67%) were not accumulating the minimum 60 minutes of physical activity recommended daily for health, and that 99.5% did not achieve the fundamental movement skill proficiency expected for their age.

Overall, the findings of this study coincide with the findings of Cabigon (2004) in which she was able to identify some research gaps and challenges in the further understanding of the Filipino adolescents today. She mentioned that to arrive at better ways, the adolescents must be provided a social safety net and introducing to them the values of maturity. In connection to this study, she stated that gaps and challenges are not exhaustive and they are considered all equally important.

Moreover, the findings corroborate with the study of Woodgate & Leach (2010) that though youth have a broad understanding of health that includes acknowledging the many different types of health beyond physical health, lifestyle factors such as healthy eating and exercise nonetheless dominate the talk of health by youth. In this study, it was further elucidated that lifestyle factors, specifically diet and exercise, are the major concern when dealing with the health status of UB first-year students.

Comparison of the Extent to which the UB Freshmen Engaged in Health Risk Behavior according to Gender and Program of Choice

Gender

The data show slight differences between the two groups. The means of the female is slightly lower than the means of the male with

regards to behaviors that contribute to unintentional injuries and violence; sexual behaviors that contribute to unintended pregnancy and sexually transmitted disease, including HIV infections; tobacco and other drug use; and alcohol use categorized as non-risky or very healthy. Unhealthy dietary behaviors are categorized as slight risky/ moderately healthy. Meanwhile, the means of the female is slightly higher than the means of the male with regards to inadequate physical activity and is categorized as fairly risky/ fairly healthy. The differences are all statistically significant with the obtained p = 0.000 < 0.05. Therefore, the null hypothesis is rejected. In other words, there is a significant difference in the extent to which the freshmen in the University of Baguio engage in health risk behaviors along the given areas according to gender. This implies that gender affects the behavior of UB first-year students towards health risk. It was presented in the study of Laska, Pasch, Lust, Story, and Ehlinger (2009) wherein resulting classes differed for males and females. Female classes: (1) poor lifestyle (diet, physical activity, sleep), yet low risk behaviors (eg. Smoking, binge drinking, sexual risk, drunk driving; 40% of females), (2) high risk (high substance use, intoxicated sex, drunk driving, poor diet, inadequate sleep) (24.3%), (3) moderate lifestyle, few risk behaviors (20.4%), (4) "health conscious" (favorable diet/ physical activity with some unhealthy weight control; 15.4%). Male classes were: (1) poor lifestyle, low risk (with notably high stress, insufficient sleep, 9.2% of males), (2) high risk (33.6% of males, similar to class 2 in females), (3) moderate lifestyle, low risk (51.0%), and (4) "classic jocks" (high physical activity, binge drinking, 6.2%). This is among the first research to examine complex lifestyle patterning among college youth particularly with the emphasis on the role of weight-related behaviors. These findings have important implications for targeting much-needed health promotion strategies among emerging adults and college youth. Moreover, with regards to physical activity, boys tend to be influenced by their friendship network to a greater extent than girls (Sawka, 2013).

Program of Choice

Behaviors that contribute to unintentional injuries and violence; sexual behaviors that contribute to unintended pregnancy and sexually transmitted disease, including HIV infections; tobacco and other drug use; and alcohol use are categorized as non-risky or very healthy. Unhealthy dietary behaviors are categorized as slight risky/ moderately healthy. Meanwhile, the means of the program of choice with regards to inadequate physical activity and is categorized as fairly risky/ fairly healthy. The obtained p = 0.000 < 0.05 value shows that the differences among the program of choice of UB first-year students are statistically significant with regards to (a) behaviors that contribute to unintentional injuries and violence, (d) alcohol use, and (f)inadequate physical activity. Therefore, the null hypothesis is rejected. This means that there are significant differences in the extent to which the UB freshmen engaged in health risk behavior according to the program of choice with regards to given areas. This implies that the students regardless of their program of choice are not aware of their behaviors towards health risk.

Meanwhile, (b) sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection (p = 0.053 > 0.05); (c) tobacco and other drug use (p = 0.363 > 0.05); and (e)unhealthy dietary behaviors (p = 0.214 > 0.05) shows that the differences among the program of choice of UB freshmen are not statistically significant. Therefore, the null hypothesis is accepted. This means that there are no significant differences in the extent to which the UB freshmen engaged in health risk behavior according to the program of choice with regards to the given areas. This implies that the students regardless of their program of choice are aware of their behaviors towards health risk.

Results are explained in the study of Kwann et al. (2013) stating that physical inactivity, binge drinking, marijuana and other illicit drug use, and risky sexual behaviors were all significantly higher

among students on smaller campuses. Significant differences also emerge in fruits and vegetable intake, smoking, and insufficient sleep. Further analyses conducted to determine whether there were significant differences between individual institutions within the larger and smaller category of school.

Perceived Consequences of Health Risk Behaviors

Perceived effects of health risk behaviors were taken from the qualitative portion of the questionnaire. The answers were categorized to look at the perceived effects of health risk behaviors according to those who said they engaged in the said activities and those who said they did not engage in the said activities. However, not all items were answered by the 114 respondents. Multiple responses were also observed among several respondents. For those who did not experience or have not engaged in the health risk behaviors, they basically perceived the ill effects of engaging in the said health risk behaviors. Thirteen recognized that it is important to wear helmets and seatbelt to avoid accidents; one declared that not wearing a seatbelt or helmet could lead to death, whereas one said that there would be no effect. On sexual behaviors, seven recognized the importance of using a condom to prevent STDs including AIDS; five know that it could also prevent pregnancy, while two did not know the effects of not using contraceptives or condoms. All responses along tobacco and other drug use show that the respondents recognize its effect on their health. In particular, the respondents associated tobacco with lung cancer. Three respondents mentioned that alcoholic drinks could cause diseases, specifically kidney disease. Seven respondents stated that trying to go without food or taking laxatives or diet pills to reduce weight was not healthy and that it could lead to diseases such as ulcer. However, one respondent claims that it would not affect. Three respondents gave answers about inactivity such as playing video games or watching TV for more than one hour in a day within the week or having no exercise within the week. The number is attributed to the situation wherein most of the

respondents actually engaged in the said health risk. Those who did not engage said that it causes laziness, dizziness and could lead to addiction.

For those who experienced or have engaged in the health risk behaviors, they were aware of the ill effects of engaging in the said health risk behaviors. Twenty-one recognized that it is important to wear helmets and seatbelt to avoid accidents; four declared that not wearing seatbelt or helmet could lead to reprimand from parents or the policemen, whereas seven said that it was fun or that it did not affect. Incidentally, those who tried bullying felt guilty or nervous about what they have done. On sexual behaviors, one admitted to having a child due to the unprotected sex while another claimed that it could lead to his girlfriend becoming pregnant. Two claimed that they feel mature by engaging in the said activity while one did not know the effects of not using contraceptives or condoms. All responses along tobacco and other drug use show that the respondents recognize its effect on their physical as well as mental health. In particular, 30 respondents claimed that they felt dizzy, lazy, weird, unproductive, unhealthy, and unfocused. While there were seven, who mentioned that they felt that smoking relaxed them or that it was pleasurable, three were ignorant as to its effect. Thirteen respondents mentioned that alcoholic drinks could cause diseases, specifically hepatitis, stomach problems, heart and respiratory problems. There were 73 who recognized the immediate ill effects such as dizziness, hangover, feeling of reduced physical and mental alertness, but there were three who claimed that it made them feel good or able to solve problems. Twenty-nine respondents stated that trying to go without food or taking laxatives or diet pills to reduce weight was not healthy and that it could lead to diseases such as ulcer. Both physical and mental health were affected as recognized by the respondents who claimed that the effects of dieting were either, nausea, vomiting, fainting, weakness, dizziness, and inability to think properly. However, one respondent claims that it did not have any effect. Eighty-three respondents who engaged in inactivity such as playing video games or watching TV for more than one hour in

a day within the week or having no exercise within the week revealed that they became lethargic, unproductive, lazy, weak, or gained weight. Sixty-three claimed that it hurt their eyes. Though there were six who claimed that it was fun and nothing happened to them, two said that it was stressful and it affected their breathing, making it difficult to breathe, and it made them irritable.

Overall, though many students are aware of the ill effects of the said health risk behaviors, there are still a few who are not aware at all. They are the ones who are most vulnerable to try these health risk behaviors in the future and pose a negative effect on their overall performance as an individual and as students. The results show that there is still a need to increase the extent of awareness on the negative health effects of all areas of health risk behaviors covered in this study such as not using helmets or seatbelts, unprotected sexual engagement, smoking, alcohol use, dieting and lack of physical activity.

Youth Health Framework for the UB Students

A youth health framework shown in Figure 1 was developed as a result of this study.



Figure 1. Youth Health Framework for UB

The framework shows that students' health risk behaviors result from the gamut of overlapping influences generally from family, friends, and neighborhood. As for the University of Baguio, the Youth (depicted by the human-shaped figure) that it caters to are exposed to health risk behaviors that include those that lead to injuries or violence, unwanted pregnancy, and STDs, illnesses due to tobacco and alcohol consumption. A more considerable portion of the risk is depicted by the feet of the human figure and concerns unhealthy dietary behaviors and lack of physical activity. The academe plays a role in developing the youth to become productive citizens of the future. It can do so by streamlining the focus of the Youth's behaviors towards healthier lifestyles that would lead them to their graduation. The academe cannot change what is going on in the environment where its students dwell, but it can bring its students in focus by presenting to them the healthier perspectives, by improving their health literacy. The School can also provide the avenue for students to use their energies in the right frontiers.

Conclusion and Recommendations

The UB freshmen in the SY 2014-2015 who participated in the study practice very healthy behaviors concerning prevention of injuries and violence, prevention of unwanted pregnancy and STDs, prevention of ill health effects of tobacco, other drugs and alcohol, and generally healthy behaviors when it comes to diet and physical activity. However, there are indications that the freshmen need to be further taught to make healthier choices, particularly concerning diet and physical activity. The health risk behaviors are health concerns which are preventable with the right choices in life. In the school where students spend most of their time, students have their friends and classmates, their teachers and the administration. With all these people around, the school is the ground that lets individuals, the students, make a choice between a healthier lifestyle or not. The youth health framework developed in this study could help

in formulating strategies to keep the students in the right perspectives.

Because YRBSS has been implemented since 1991, YRBSS data can be used to assess both long-term temporal trends (i.e., as long as 24 years) and more recent 2-year temporal changes in health behaviors. This study may serve as baseline data for long-term linear increases and decreases in prevalence, which reflect real reductions in risk behaviors and potential improvements in health outcomes among students nationwide (CDC, 2016).

Based on the findings of the study, the youth health framework developed in this study and the preceding conclusion, the following are recommended by the researchers:

- 1. The SOCORN programs of the University of Baguio across all schools should consider a series of health-related awareness seminars and training focusing on the health risk behaviors. The following topics can be considered: Knowing one's self and overcoming sadness, Crash course on ill health effects of tobacco and other drugs as well as alcohol consumption, Reproductive Health: Knowing the risks and realities. It is further suggested that professional speakers and trainers handle these topics so as not to depend on the facilitators alone.
- 2. The NSTP program should include activities that not only enhance the students' artistic ability but enable them to engage in physical activities to develop the habit of healthy living.
- 3. The administration can look into nutrition campaigns within the campus such as posters, competitions, and researches to help initiate healthier food choices.



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The performance of service quality in the Graduate School of the University of Baguio

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Abstract

Service quality and clients' satisfaction are important for all business entities and educational institutions for them to know how to measure these constructs from the clients' perspective to better understand their needs and hence satisfy them. Service quality is crucial because it leads to higher clients' satisfaction which in turn maintain loyalty and continuous purchase towards profit. This research used an enhanced SERQUAL instrument contextualized to the services offered by the Graduate School of the University of Baguio. The questionnaire covered the five generic dimensions of service quality and added education and research factors. The reliability of the data gathering tool by Cronbach Alpha was confirmed (r=.9) which focused on the agreeability and satisfaction of the students with the different dimensions of service quality. Ninety-seven (97) graduate students voluntarily participated from the 204 total enrollees of the first semester of SY 2017-2018. Aside from descriptive and inferential statistics, Gap 5 was also used to analyze the data. Students very much agreed to the service quality expected to be offered by the graduate school and likewise, they were very much satisfied with them. Age group is a

factor while gender is not. However, considering the different dimensions of service quality, empathy and research factor are affected by gender at 5% level of significance. There was a definite gap five score indicating that expectations were not met and hence, service performance was not good. Therefore, service quality performance needs further improvements to increase satisfaction. The satisfaction of students on service quality offered by the graduate school was influenced by their expectations on service quality ($R^2 = .5868$). The regression model fits the data (p < .05).

KEYWORDS: EXPECTATIONS, SATISFACTION, SERVICE QUALITY, PERFORMANCE, SERVQUAL

Introduction

he proliferation of private higher education institutions worldwide brought competitions in higher education. The competition in education as stated in Ahmed & Masud (2014), was improving through the increasing recognition of the importance of service quality as a strategy. The availability of many higher education institutions provided many options for students to choose from in the pursuit of their formal education. To survive in this highly competitive market in higher education, quality service should be demonstrated for a customer focused service institution.

Service quality as defined by Hasan, Ilias, Rahman & Razak (2008) revolved around the idea that quality had to be judged on the assessment of the user of the service. The construct of quality had already been established in the service-related literature based on the discrepancy between the customer's service perceptions and expectations. If the perception is higher than the expectation, then the service is said to be of high quality. The construct of service quality based on SERVQUAL as contextualized in Higher Education Institutions particularly in the

Graduate Schools were manifested among others in the studies of Ahmed & Masud (2014) and Manaf, Ahmad & Ahmed (2013) in the Graduate School in Malaysia; Sokoya (2014) on measuring quality in graduate education; Rasli, Shekarchizadeh, & Iqbal (2012) on a gap analysis between perception and expectation of service quality in higher education from the perspectives of Iranian postgraduate students; and Bhengu (2015) on the investigation of service quality perceptions of MBA students of South African retail banks.

Customer satisfaction is a term frequently used in marketing which is also applicable in today's competitive environment of higher education. Satisfaction is commonly seen as how services are being delivered which reflects the experiences of customers on the quality of service they received considered by Johnson, Gustafsson & Roos (2006) as an overall evaluation of performance to date. Lassar, Manolis & Winsor (2000) recognized satisfaction with extraordinary high monetary value for a service-oriented organization in a competitive environment.

Service quality was considered very important because it leads to higher customer satisfaction, profitability, reduced cost, customer loyalty, and retention (Nde, Lukong, & Berinyuy, 2010). Thus, it became a critical determinant of customers' satisfaction; their association became a significant topic of interest in marketing which included higher education. Service quality and satisfaction had played a crucial role in attracting, retaining and fostering stronger relationships with students. If the expectation of students on quality service cannot be fulfilled by an institution, according to Hasan, Ilias, Rahman, & Razak (2008), it became a key factor for a student's withdrawal. Hence, meeting students' expectations of the services of the institution will give the opportunity to support their continued enrolment to the institution. This is because service quality mediated by the satisfaction of customers created competitive advantages and customer loyalty (Jacobucci, Ostrom & Grayson, 1995) where universities cannot survive long without providing quality services (Aly & Akpovi, 2001).

Universities have seen that higher education has become a service oriented and have been driven by competition to examine the quality of their services, one way to redefine their function is to measure student satisfaction in ways that are familiar to service marketing specialists (Kotler, 1985).

In the United States, there were 15 private and 15 public universities with the highest rates of student satisfaction determined by data points like student retention, student-to-faculty ratio, and others. Princeton University from private universities was ranked first and followed by Dartmouth College with 85% and 81% satisfied students respectively. Particularly on the following: challenging courses instructed by well-respected faculty members, state-of-the-art research facilities, a diverse campus population, student-led clubs and organizations, and low tuition (bestcolleges, 2016). With these results, American higher education remains the envy of the world, however, respect really only extends to a few hundred universities at the most.

In the United Kingdom, student satisfaction was considered an important factor when choosing a university. Prospective students want to know that they're going to get their money's worth and which school will give them peace of mind. There were top 5 Universities for Student Satisfaction in 2017. University of Buckingham was ranked first where students left delighted with the academic staff saying they were easily reachable, enthusiastic and interesting (thecompleteuniversityguide, 2017).

For the international students, Garrett (2014) studied their satisfaction and found that a significant majority of them, undergraduate and graduate, were "satisfied" but only a minority were "very satisfied" with their overall experience. There was a close correlation between satisfaction and willingness to recommend the institution. However, on the other hand, there was a negative correlation between a higher international student ratio and satisfaction with lecture quality and time with faculty outside of class. When it comes to Nationality, on average, students from Europe were significantly more satisfied than students from most parts of Asia and the Middle East.

In Europe, a study of Student Satisfaction, Needs, and Learning Outcomes on student services and co-curricular activities was conducted by Herdlein & Zurner (2015). The study demonstrated that students viewed interactions outside the classroom as important opportunities to develop and hone a myriad of personal knowledge and skill sets important to becoming global citizens and internationally competent professionals.

In Australia, the satisfaction of international postgraduate business students from China, India, Indonesia and Thailand was also studied by Arambewela & Hall (2009). The findings indicated that the importance of service quality factors related to both educational and non educational services varies among nationality groups and, therefore, had a differential impact on student satisfaction.

Further, a related study was conducted in Asia on factors influencing satisfaction of postgraduate international students (Arambewela, Hall, & Zuhair, 2008). The study found that the dominant factors that impact on student satisfaction were quality of education, student facilities, the reputation of the institutions, the marketability of their degrees for better career prospects, and the overall customer value provided by the universities.

In the Philippines, a study conducted by Santos (2009) on students' satisfaction rating in La Consolacion College Manila on students' services revealed satisfactory results in all the eleven service units which included guidance, student affairs, security, food and others. While in UP Los Banos, Laguna; about 85% of students who participated in the study were either satisfied or very satisfied with their overall experience on the Online Student Portal (Secreto & Pamulaklakin, 2015).

In the Cordillera Administrative Region, a study conducted by Dulay & Razalan (2015) showed a satisfactory organizational climate in Chartered Higher Education Institutions (HEI) in Cordillera Administrative Region (CAR), that reflects a socially healthy atmosphere but still with many desirable improvements to be institutionalized. Though the study presented above focused on organizational climate, other dimensions of service quality were reflected like physical presence under the tangibles and the relationship of attitudes to assurance, responsiveness, empathy and reliability.

Satisfaction of students is really very important as students are considered the blood life of educational institution because without them means death of the school. Hence, an educational institution should be student-focused and service-oriented particularly considering students' perceptions of the quality of services offered to them and their satisfaction with them.

Hence, quality service became a paramount concern to both service providers and users as noted one among the priority areas under student services (UB Research and Development policies and operations manual, 2015). To assure quality service from customers' perspectives, a continuous satisfaction evaluation should be conducted resulted in the conceptualization of this study. It aimed to determine the performance of the Graduate School of the University of Baguio through expectations and satisfaction of students on service quality grounded by the service quality - satisfaction-loyalty model by Johnson, Gustafsson & Roos (2006).



Figure 1. The Service Quality-Satisfaction-Loyalty Model

The model clearly illustrated the importance of service quality which defines customers' satisfaction to assure customers' loyalty. The concept of this model is re-enforced by the Service-profit chain Model of Bhattacharjee (2006).





These models clearly presented link between service quality and satisfaction towards customers' loyalty for profit and growth. These models are further aligned with the Social Exchange Theory of Thibault & Kelley in 1959 which posited that all human relationships are formed by the use of a subjective cost-benefit analysis, which yield the highest profits. When costs exceed rewards, people seek to dissolve the relationship. Relationship marketing theory maintains that consumers enter into relational exchanges with business entities when they believe that the benefits derived from such relational exchanges exceed the costs.

The study looked into the correlation between students' expectation on service quality and their satisfaction to these service quality they received. Specifically, it seeks to answer the following problems:

- 1. How do students perceive their expectations on the dimensions of service quality offered by the Graduate School of the University of Baguio?
 - 1.1 Is there a significant difference on the perception of students on their expectations on the different dimensions of service quality offered by the Graduate School of the University of Baguio according to gender, age, and program?
- 2. What is the level of satisfaction of students on the different dimensions of service quality rendered by the Graduate School of the University of Baguio?
 - 2.1 Is there a significant difference on the level of satisaction of students in the different dimensions of service quality rendered by the Graduate School of the University of Baguio according to gender, age, and program?
- 3. What is the relationship between the perceived expectations of service quality and their satisfaction on them?

Methodology

Descriptive research design was employed in the study to describe the expectations and satisfaction of students on service quality offered by the Graduate School of the University of Baguio. Descriptions and differences of numerical information on categories mainly according to gender, age groups and course or program were included. Relationship of expectations and satisfaction was further analyzed considering what Spreng & Mackoy (1996) mentioned that service quality is an antecedent to satisfaction.

The questionnaire was used to gather data which included the five dimensions of service quality (SERVQUAL) by Parasuman and items related to education and research factors. The five dimensions of SERVQUAL were assurance, empathy, reliability, responsiveness and tangibles demonstrated in the services offered by the Graduate School of the University of Baguio. The questionnaire was pretested to graduate school students of the University of Baguio enrolled during the short term period of 2017 and obtained a very high internal consistency (r=0.9).

There were 97 who voluntarily answered the questionnaire completely. The data gathered were subjected to statistical analysis using the Statistical Package for Social Sciences Version 20 (SPSS 20) under license of the University of Baguio Research and Development Center. Gap analysis (Gap 5), descriptive and inferential statistics were used to analyze data. All data gathered were kept and treated with the utmost confidentiality.

Results and Discussion

The Expectations of Students on Service Quality of the Graduate School of the University of Baguio

The expectations of students on service quality are the quality of service they believed to be offered to them or what Arlen (2008) considered as what customers' care about to service provider to maintain their loyalty.

Table 1

The Agreement of Students on the Dimensions of Expected Service Quality Offered by the Graduate School of the University of Baguio (n=97)

	Dimensions of	LEVEL OF AGREEMENT				
	Service Quality	MEAN	SD	INTERPRETATION		
1.	Tangibles	3.2815	.17248	Strongly agreed		
2.	Assurance	3.5701	.08200	Strongly agreed		
3.	Reliability	3.5636	.02926	Strongly agreed		
4.	Responsiveness	3.4963	.04644	Strongly agreed		
5.	Empathy	3.5767	.04149	Strongly agreed		
The Qua	Five Generic Dimensions of Service ality	3.4976	.12507	Strongly agreed		
6.	Education Factor	3.5619	.05284	Strongly agreed		
7.	Research Factor (n=36)	3.6655	.04948	Strongly agreed		
ov	ER-ALL	3.5209	.16077	Strongly agreed		

Students strongly agreed (3.5209) on the different expected dimensions of service quality offered by the Graduate School of the University of Baguio including education and research factors. Hence, essential to be provided in the Graduate School of the University of Baguio. The strong agreement indicates that service quality is important to students. However, Arlene (2008) posited that the five generic dimensions of service quality are not of equal importance or weight. Tangibles are the least important which is reflected in the agreement of the students with the lowest mean score. This result is confirmed in the findings of most of the studies conducted on service quality. However, in parks, tangibles were considered the most important dimension of service quality (Hamilton, Crompton & More, 1991). Though tangibles were considered least important, the physical facilities, equipment, and appearance of the personnel are still needed in the conduct of service quality. Hence, the institution should still invest in improving physical installations and equipment in the performance of service quality. As one commented, "the classrooms are not ideal for learning and likewise their locations and should be relocated to places where there is no disturbances and noise particularly coming from the senior high school."

The adequacy of computers for students obtained the lowest weighted mean score of 2.8351 which imply that the need on computers is not as significant compared to the other tangible indicators since most of them have their personal computers to use. The highest weighted mean score of 3.5773 is on the existence of a comfortable place for consultation. Hence, students in the graduate school still have concerns or issues to talk about in a comfortable private place. A consultation room is required by the Philippine Association of Colleges and Universities Commission on Accreditation (PACOCUA) hence, important to be provided to students.

Among the five generic dimensions of service quality, empathy is rated the highest thus considered most important to graduate students. This shows that students seek most access, communication, understanding and individualized attention than performing promised service dependably and accurately as noted in Arlen (2008) most important dimension. However, the prioritization of students to empathy is not shared in the study of Kabir and Carlsson (2010) where individualized attention cared less in the destination Gotland. Among its indicators, the most important is on the fairness of treatment of staff to students while appropriateness of available material is least important as noted in its lowest mean score. Hence, the fairness of treatment by staff is preferred over the appropriateness of available materials. Moreover, assurance is rated higher than reliability which also indicates that inspiring trust and confidence based on competence, courtesy, credibility, security, and knowledge of employees is needed more than reliability. On reliability, the most important is on the accuracy of data, information or reports while the efficiency of the services delivered is least. This shows that

reliability is based mostly on the accuracy of service quality than doing the service quality in a given time frame or in an optimal way. On assurance, courteousness and trustworthy of the staff and faculty members is most important (3.6701). The security measures in the graduate school obtained the lowest weighted mean score of 3.4021. From these results, trust and courtesy manner is most considered than those related to safety measures. However, the strong agreement on assurance still conveys the importance of security measures. The second most important dimension noted in Arlen (2008) on responsiveness is not shared in the graduate school. This was on the willingness to help customers and provide prompt service. Among its indicators, the highest weighted mean score of 3.5670 is on the faculty members being capable of solving problems as they arise. The need is really relevant for students in the Graduate School to help them cope with their academic problems due to the nature of a graduate education where students are treated as independent in their search for knowledge. As such, their search will also be guided by faculty members. Queries dealt with promptly, and the easy access to the graduate school by phone both obtained the lowest rating of 3.4330. Though the mean score of these indicators falls under very much agreed, they are still needed in the performance of service quality. However since it was rated lowest, the demand is the least priority.

The overall mean score of the SERVQUAL five dimensions of service quality is 3.4734 lower than education and research factors. Research factor is rated the highest due to its need and importance not only to theses and dissertations required before students can graduate but also research output. Research output was noted as one of the indices considered in measuring quality education in the graduate school (Sokoya, 2014). Under the research factor, all its indicators are strongly agreed upon by the students. The highest mean score of 3.7778 is on both qualified panel members of theses or dissertations based on the qualifications set by R&DC and on the advisers helping in addressing concerns and questions of panelists of theses or dissertations. Some of

the qualifications of the panel member of the thesis or dissertation are at least conducted studies and attended several trainings and seminars on the conduct of research. These results show that qualifications of panel members are recognized needed by students to help them in the making of their theses and dissertations. Therefore, the institution should require all those who are engaged in research to attend seminars and trainings to enhance not only their qualifications as panel members but further enhance their capabilities in research. The least mean score of 3.5833 is on both the responsibility of advisers of theses or dissertations in guiding students in the making of theses or dissertations from the proposal to final defense and the opportunity for students to present their theses and dissertations during the final defense. Hence, the responsibility of advisers and opportunity for presentation of thesis or dissertations are least important. The opportunity for students to present their theses and dissertations is considered the least priority since it requires time and preparation which could affect the working time schedules of working students. Some working students prefer easier and lesser time of accomplishing academic requirements. As to the responsibility of advisers and panel members which was rated lowest also, this could be explained by students' consideration of their responsibility in finishing their theses or dissertations. Moreover, most of the time students are on their own in making their studies without much help from the advisers. Hence, these indicators are considered least needed in the service quality. On education factor which composed of 14 indicators, the highest mean score is 3.6598 on the course which provided exposure to real-world topics while the appropriateness of available course materials is rated lowest of 3.4742. Thus, the greatest concern of students among others is on their exposure to real-world topics which certainly influence their satisfaction and therefore should be considered by the faculty members of the Graduate School of the University of Baguio. The availability of appropriate course materials is rated lowest (3.4742) due to technology, particularly the used of Google for easy access to these materials.

When gender is considered, both males and females strongly agreed on the expected service quality the Graduate School should offer as shown in Table 2.

The five generic dimensions both in males and females obtained the least mean score while research factor remains the highest. Research factor is consistently recognized most needed than the five generic dimensions and education factors. This result could be explained by the fact that theses or dissertations are the final output before graduation.

Table 2

The	Expectations	of Students	on the	Dimensions	$of\ Service$	Quality
Offe	red by the Gra	aduate Schoo	ol of the	University of	f Baguio by	Gender

	DIMENSIONS OF	MALE	(n=33)	FEMALE (n=64)		
	QUALITY SERVICE	MEAN	SD	MEAN	SD	
1.	Tangibles	3.3228	.22999	3.2602	.16904	
2.	Assurance	3.6031	.10677	3.5531	.08086	
3.	Reliability	3.5682	.04311	3.5612	.03294	
4.	Responsiveness	3.5130	.08018	3.4877	.03933	
5.	Empathy	3.6118	.05772	3.5586	.05691	
The	Five Generic Dimensions of	2 5020	10504	2 4592	16676	
Ser	vice Quality	5.5028	.16504	5.4565	.10070	
6.	Education Factor	3.5520	.10711	3.5670	.04393	
7.	Research Factor (n=36)	3.6250	.06503	3.6858	.06948	
ov	ER-ALL	3.5443	.18349	3.5087	.16335	

Note: 1.00 - 1.75 — Not Satisfied, 1.76 - 2.50 — Satisfied,

2.51 - 3.25 - Much Satisfied, 3.26 - 4.00 - Very Much Satisfied

Considering the five generic dimensions of service quality, both males and females did not conform to Arlen's (2008) order of importance. Hence, the five generic dimensions are differently viewed by students when it comes to their importance to them compared to Arlen (2008).

Particularly, the five generic dimensions are rated higher by males than females where empathy is most important to males while reliability to females. Tangibles remain the least cared of observed in both males and females. However, among its indicators, conducive classroom to learning is highest (3.7576) rated by male students while a comfortable place for consultation is the highest (3.5469) rated by female students. This is so, the fact that female students tend to consult somebody for their problems and expressions of their problems are easier for them than males. Hence, consultation room is needed the most for privacy. As to male students, the highest rating could be attributed to the fact that males stayed more in the classrooms for learning activities and generally not so vocal for concerns and problems; thus, a conducive classroom for learning is most preferred than consultation room. Macrae (2013) noted that females are the more talkative sex due to higher language protein in their brain (FoxP2) which made them chattier. However, both males and females share in their least important indicator under tangibles on the adequacy of computers for students. This result could relate to the fact that most of the graduate school students had their personal computers for their consumption since most of them are working and therefore financially capable of procuring their own material needs for academic purposes.

On education and research factors, females rated them higher than males. Among the education indicators, male students considered the course is providing exposure to real-world topics most important (3.7576) while female students considered the course is helping them in their professional career. The least important is the availability of appropriate course materials for males and just enough breadth of the curriculum for professional development and an opportunity for intellectual stimulation in all classroom activities for females.

On research factor, male students recognized most the technical competence of the panel members of theses or dissertations while the ability of qualified panel members of theses or dissertations and advisers

in helping solve or address concerns and questions of panelists of theses or dissertations for females. The least cared of by males is on the feasibility of all the suggestions of panelists to the study. While females are on the following: responsible advisers of theses or dissertations in guiding students in the making of theses or dissertations from the proposal to final defense, observing the five working days of panelists in scrutinizing or reviewing theses and the opportunity of students to present their final defense of theses. Considering the mean scores to gauge the importance of the different indicators of research, these least rated indicators for males and females are then considered the least important to them.

As a whole, the mean difference between the expectations of males and females is not large enough to be significant (p > .05). Hence, expectations for service quality are not affected by gender. However, in Bebko (2000), the demographic characteristics was stated may be responsible for the significant differences in the expectations of quality. Considering the five generic dimensions, expectations on empathy and research factor are found affected by gender (p > .05). Though women are more sympathetic than men (Toussaint & Webb, 2005), male students need more empathy in service quality than females. For the research factor, the rating of females is greater by 0.0608 than males. This difference is large enough to be significant. Hence, gender difference exists in the expectations of students in research factor in service quality.

All the other dimensions of assurance, reliability, responsiveness, tangibles, and education factor are similarly perceived by students when group according to gender (p > .05).

On expectations according to age groups, generally, they vary due to experiences obtained in the number of years lived as shown in Table 3.

Table 3

The Agreeability of Students by Age Group (20-34 years old) on the Dimensions of Expected Service Quality Offered by the Graduate School of the University of Baguio

	DIMENSIONS OF QUALITY SERVICE	20-24 YEARS OLD (n=41)		25-29 YEARS OLD (n=13)		30-34 YEAR OLD (n=16)	
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.28	.161	3.32	.242	3.44	.230
2.	Assurance	3.57	.080	3.61	.193	3.80	.105
3.	Reliability	3.50	.053	3.47	.095	3.87	.092
4.	Responsiveness	3.43	.072	3.39	.132	3.81	.074
5.	Empathy	3.50	.058	3.49	.100	3.88	.074
The	e Five Generic Dimensions of	3 11	153	3 / 5	205	3 72	222
Ser	vice Quality	5.77	.155	5.45	.205	5.72	.252
6.	Education Factor	3.51	.075	3.47	.186	3.88	.055
7.	Research Factor (n=36)	3.67	.076	3.96	.083	3.73	.115
ov	ER-ALL	3.49	.163	3.55	.273	3.74	.206

Note: 1.00 - 1.75 - Not Satisfied, 1.76 - 2.50 - Satisfied,

2.51 - 3.25 — Much Satisfied, 3.26 - 4.00 — Very Much Satisfied

There are significant differences in the expectations of the graduate school students on service quality according to age group (p < .05). Hence, the age group affects the expectations of students on service quality. However, this result is not reflected in the findings of KhareeCeeba & Rai (2010) in Indian retailing but corroborated with the findings of Uddin, Saha, Ali & Rana (2016) and Christial & Ard (2016) along the five dimensions of service quality in Bangladesh banks and medical office respectively.

Table 4

The Agreeability of Students by Age Group (35-45+ years old) on the Dimensions of Expected Service Quality Offered by the Graduate School of the University of Baguio

	DIMENSIONS OF QUALITY SERVICE	35-39 YEARS OLD (n=11)		40-44 YEARS OLD (n=7)		45+ YEARS OLD (n=9)	
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.33	.168	2.87	.324	3.23	.228
2.	Assurance	3.53	.109	3.19	.271	3.48	.065
3.	Reliability	3.66	.041	3.32	.108	3.53	.069
4.	Responsiveness	3.57	.075	3.24	.153	3.52	.070
5.	Empathy	3.61	.078	3.40	.140	3.63	.080
The	e Five Generic Dimensions of	2 51	167	2.16	200	2 4 4	201
Ser	vice Quality	3.51	.107	3.10	.308	3.44	.201
6.	Education Factor	3.63	.024	3.22	.122	3.55	.081
7.	Research Factor (n=36)	3.53	.353	4.00	.000	3.33	.163
ov	ER-ALL	3.53	.210	3.33	.418	3.43	.193

Note: 1.00 - 1.75 — Not Satisfied, 1.76 - 2.50 — Satisfied,

2.51 - 3.25 - Much Satisfied, 3.26 - 4.00 - Very Much Satisfied

At most, the significant mean differences exist between the highest age groups and the younger ones. The age group with the highest weighted mean score (3.7381) is from 30 to 34 years old while the lowest (3.3288) is under 40 to 44 years old. Tangibles remain the least important dimension across age groups.

Dominantly, the younger groups look into research factor most while, the older ones cared most the education factor which could be attributed to their needs based on their experiences.

Finally, course or program was also considered a differentiating factor to the expectations of students on the dimensions of service quality.

Tangibles remained the least important service quality while the most important differs across a program as shown in Table 5.

Table 5

The Expectations of Students on the Dimensions of Service Quality offered by the Graduate School of the University of Baguio according to Course/Program

	DIMENSIONS OF QUALITY SERVICE	MPA/ (n=	MPA/MBA CRIM (n=45)		NOLOGY =27)	EDUCATION (n=25)	
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.15	.180	3.39	.190	3.39	.206
2.	Assurance	3.47	.089	3.67	.079	3.65	.133
3.	Reliability	3.47	.051	3.67	.042	3.62	.097
4.	Responsiveness	3.37	.072	3.66	.064	3.54	.094
5.	Empathy	3.52	.067	3.63	.084	3.63	.085
The	e Five Generic Dimensions of	2 27	105	2 50	160	2 55	170
Ser	vice Quality	5.57	.105	5.56	.109	5.55	.170
6.	Education Factor	3.50	.047	3.53	.100	3.70	.070
7.	Research Factor (n=36)	3.76	.074	3.78	.084	3.46	.113
ov	ER-ALL	3.46	.219	3.61	.172	3.55	.170

Note: 1.00 - 1.75 - Not Satisfied, 1.76 - 2.50 - Satisfied,

2.51 - 3.25 - Much Satisfied, 3.26 - 4.00 - Very Much Satisfied

The research factor consistently obtained the highest, however from the MPA/MBA and Criminology groups only. The education group rated education factor as the highest. The differences in mean scores imply differences in the prioritization of needs. These differences in the prioritization of needs are significant at 5% (p < .05). Most of the significant differences are observed between education and the other programs or courses.

The Satisfaction of Students on the Dimensions of Service Quality Offered by the Graduate School of the University of Baguio

Satisfaction refers to the perceptions of the service quality received or the experiences on these service quality. Satisfaction of service quality is needed to assess the performance of the Graduate School.

As a whole, students are very much satisfied (3.4280) on the service quality they received from the Graduate School of the University of Baguio. Among the seven dimensions, the highest is on the research factor while the lowest is on the tangibles. Tangible is the only dimension considered much satisfied. The easy access to internet/e-mail services (M=2.6289), adequacy of computers for students (M=2.9691), well-cleaned classrooms (M=2.9794) are crucial to tangibles.

Considering other indicators of the service quality as noted in Appendix A. Particularly starting with the most important service dimension as noted in Arlen, reliability, kept accurate records and other related documents, convenient office hours for students, and proficient lecturers in their teachings obtained equal ratings of 3.5052 which is the highest mean score of satisfaction. The lowest rated indicator is on the orderly enrollment of mean score 3.4124. On the second most important dimension, responsiveness, crucial of students' satisfaction is the availability of active channels of expressing student complaints and easy contact of the graduate school by phone of which both obtained a mean score of 3.2577. While available staff in the time of students' needs or assistance and queries dealt efficiently are highest rated indicators (M=3.4433). However, the latter obtained a greater variability by .1636. On the dimension considered the third highest weight in importance, the assurance, among its 20 indicators, the highest rated are courteous faculty members, professionally competent staff in performing their services and innovative and agents of change lecturers of an equal mean score of 3.6082. While courses well taught by the lecturers in the graduate school is rated the lowest. On the second least important dimension considering its weight given by Arlen on empathy, its highest-rated indicator in terms of satisfaction by students is readily approachable staff (M=3.5464). However, a comment on "a lady staff of the graduate school talk to me unprofessionally without realizing that I am a professional ..., I deserve better for I pay high for their services" should be considered. While the lowest is on the actual dealing of faculty members with the problems of students (M=3.4124). The sincerity of faculty members in dealing with students' problems should be checked for better satisfaction of service quality.

Table 6

The Level of Satisfaction of Students on the Service Quality Rendered
by the Graduate School of the University of Baguio (n=97)

DIMENSIONS OF SERVICE QUALITY	MEAN	SD	INTERPRETATION
1. Tangibles	3.1760	.18563	Much satisfied
2. Assurance	3.4940	.08975	Very much satisfied
3. Reliability	3.4742	.03046	Very much satisfied
4. Responsiveness	3.3689	.06697	Very much satisfied
5. Empathy	3.4755	.03608	Very much satisfied
The Five Generic Dimensions of Service Quality	3.3741	.17601	Very much satisfied
6. Education Factor	3.4470	.06452	Very much satisfied
7. Research Factor	3.6146	.05328	Very much satisfied
OVER-ALL	3.4280	.17688	Very much satisfied

Dominantly, indicators of the five generic dimensions are considered very much satisfied which may relate already to the quality of the performance on the delivery of these service quality.

Under education and research factors, satisfaction on the different

indicators is very much satisfied by students of which research factor has the highest mean score. Considering their indicators also, under education, its highest is on the course which helped me in my professional career (M=3.5670) while its lowest mean score of 3.3505 is on the availability of appropriate course materials. Under research factor, among its 24 indicators, the qualifications of panel members of theses and/or dissertations obtained the highest mean score of 3.7222 while the lowest is on the advisers contributing relevant inputs in the making of theses and/or dissertations and on the panelists giving detailed comments in theses or dissertations of equal mean score of 3.5278.

Table 7

The Level of Satisfaction of Students on the Services Rendered by the Graduate School of the University of Baguio according to Gender

	DIMENSIONS OF	MALE (n	=33)	FEMALE (n=64)
	QUALITY SERVICE	MEAN	SD	MEAN	SD
1.	Tangibles	3.1736	.23729	3.1773	.16926
2.	Assurance	3.5106	.12214	3.4855	.09508
3.	Reliability	3.4545	.07968	3.4844	.04520
4.	Responsiveness	3.3311	.11051	3.3884	.06453
5.	Empathy	3.4299	.04023	3.4990	.05802
The	e Five Generic Dimensions of Service	3.3602	.20050	3.3813	.17500
Qu	ality				
6.	Education Factor	3.4264	.09693	3.4576	.05986
7.	Research Factor (n=36)	3.6528	.08026	3.5955	.07319
ov	ER-ALL	3.4233	.20751	3.4306	.17230

Note: 1.00 - 1.75 - Not Satisfied, 1.76 - 2.50 - Satisfied,

2.51 - 3.25 — Much Satisfied, 3.26 - 4.00 — Very Much Satisfied

Both males and females are very much satisfied with the service quality they received from the Graduate School. However, the satisfaction of males is more dispersed than females (.20751>.17230). Among the seven dimensions of service quality, the research factor is consistently rated both by males and females the highest while tangible is the lowest. Tangible is the only dimension considered much satisfied by both males and females. Hence, physical aspects of service quality need more attention for improvement for better satisfaction. All the other dimensions are very much satisfied with mean scores higher than 3.25.

Under tangibles, the well-dressed faculty members obtained the highest mean score of satisfaction for both males and females of 3.5152 and 3.5000 respectively. The highest satisfaction rating is expected as the dress code is to be observed by all teaching employees of the University of Baguio. Similarly, both gender shared the same perceptions on their experiences on easy access to internet/e-mail services considered with the lowest mean score of 2.5152 and 2.6875 respectively, but females' satisfaction is more varied than males. As observed, access to internet or e-mail services is very limited and very slow in the institution as usually noted complaints from all stakeholders. Similar comment on the slow internet was noted in the responses of students in the utilization of the library resources and services. In faculty rooms, there were instances that the internet is slow and sometimes connections were even lost. This lowest satisfaction rating under tangibles could imply prioritization of improvement.

On the highest rated dimension, the research factor, the technical competence of panel members of theses or dissertations is rated the highest (3.8333) by male students while the female students are on how advisers helped them addressed their concerns and questions of panelists in their theses or dissertations (3.7500). The overall mean score of females is greater than the mean score of males by .0073. These are the highest indicators of the research factor the fact that most of the professors in the Graduate School are master's and doctor's degree expected to be experienced in the making theses and dissertations and therefore were able to manage to assist their advisees or students in their research papers.

Since research factor is with the highest rating of satisfaction, in terms of performance, the least priority to improve among the indicators of service quality as also reflected in Table 11 with the lowest gap score (.0509*).

Generally, gender differences exist in all aspects of life. However, when it comes to satisfaction and gender, most studies found that there were no significant differences. An example is the finding of Min & Khoon (2013) where gender was not a significant factor in the satisfaction of international students of service quality in higher education. A similar finding is observed in the Graduate School of the University of Baguio where satisfaction on service quality is irrespective of gender. The overall mean difference in the satisfaction of service quality between males and females is not large enough to be significant at 5% level. However, as noted in Elias, Hasan, Rahman & Yasoaon (2008) some studies suggested otherwise finding that women have a lower satisfaction compared to men and considering service quality, males are more satisfied than females. Likewise, in the study of Mokhlis (2012), gender affected the perceptions on service quality however of Khok Pho municipality in Pattani Province, southern Thailand. Further, gender difference existed in the healthcare of which women tend to be least satisfied than men (Papastavrou, Andreou, Tsangari & Merkouris, 2014). Furthermore, in the two studies presented in Min & Khoon (2013), one study found that gender difference existed in the students' opinion with regard to the service quality of departments of the university where female respondents were more satisfied than the male respondents. The other study found that gender was not a significant factor however in passenger transport services.

However, considering each dimension of the service quality, two (2) of which are affected by gender. The mean differences in the satisfaction of students by gender in empathy and research factor are large enough to be significant at 5% level. The greater mean score of female on empathy may imply that communication, understanding and individualized attention was better served to the female students because generally, females tend to be more conversant and more open to communicate their concerns and problems than males. This result was similarly observed in the study of Karatepe (2015) where gender moderated the effects of empathy however also observed under the reliability of customer satisfaction.

However, in the research factor, the higher mean score of males is contributed by their very high rating on the technical competence of the panel members of theses or dissertations of 3.8333 against 3.5833. The difference 0.25 is the greatest mean difference between males and females on satisfaction among the indicators of research factor.

The gender differences in satisfaction on empathy and research factor are suggestive of identifying and handling gender issues and concerns in creating customer satisfaction. For example under empathy, equal opportunity for communication, understanding and individualized attention should be served.

All the other dimensions of service quality have mean differences considered not significant (p < .05). Particularly, these dimensions are tangibles, assurance, reliability, responsiveness and the education factor. These results are similarly observed in the study of Grazhdani & Merollari (2015) where male and female scores of service quality however in all dimensions in Albanian banking industry did not differ significantly.

Age group is another intervening factor considered in the satisfaction of students on service quality.

Table 8

The Level of Satisfaction of Students on the Services Rendered by the Graduate School of the University of Baguio according to Age Group (20-34 years old)

	DIMENSION OF SERVICE QUALITY	20-24 YEARS OLD (N=41)		25-29 YEARS OLD (n=13)		30-34 YEAR OLD (n=16)	
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.18	.183	3.44	.231	3.2	.179
2.	Assurance	3.53	.118	3.64	.118	3.49	.119
3.	Reliability	3.50	.064	3.60	.079	3.44	.094
4.	Responsiveness	3.38	.094	3.48	.070	3.50	.111
5.	Empathy	3.56	.062	3.57	.039	3.55	.103
The	e Five Generic Dimensions of	3.41	.200	3.54	.164	3.42	.184
Ser	vice Quality						
6.	Education Factor	3.47	.071	3.64	.049	3.49	.104
7.	Research Factor (n=36)	3.62	.100	3.99	.041	3.75	.082
ov	ER-ALL	3.45	.192	3.64	.224	3.49	.205

Note: 1.00 - 1.75 — Not Satisfied, 1.76 - 2.50 — Satisfied, 2.51 - 3.25 — Much Satisfied, 3.26 - 4.00 — Very Much Satisfied

Table 9

The Level of Satisfaction of Students on the Services Rendered by the Graduate School of the University of Baguio according to Age Group (35-45+ years old)

	DIMENSION OF SERVICE QUALITY	35-39 YEARS OLD (n=11)		40-44 YEARS OLD (n=7)		45+ YEARS OLD (n=9)	
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.06	.281	2.98	.537	2.97	.249
2.	Assurance	3.40	.154	3.41	.149	3.29	.178
3.	Reliability	3.41	.126	3.49	.155	3.28	.209
4.	Responsiveness	3.34	.119	3.40	.211	2.93	.172
5.	Empathy	3.34	.113	3.37	.233	3.05	.121
The	e Five Generic Dimensions of	3 78	235	3 28	387	3 09	246
Ser	vice Quality	5.20	.255	5.20	.502	5.09	.240
6.	Education Factor	3.43	.043	3.18	.198	3.21	.162
7.	Research Factor (n=36)	3.56	.376	4.00	.000	3.08	.147
ov	ER-ALL	3.35	.277	3.41	.435	3.10	.224

Note: 1.00 - 1.75 - Not Satisfied, 1.76 - 2.50 - Satisfied,

2.51 - 3.25 — Much Satisfied, 3.26 - 4.00 — Very Much Satisfied

The mean score of 3.1010 under 45 years old is the lowest among the mean scores from other age groups on the satisfaction of service quality. Since 3.1010 is lesser than 3.26, the oldest group age is only much satisfied with the service quality they received from the Graduate School of the University of Baguio. All other age groups of students are very much satisfied with the service quality of the Graduate School with the highest mean score of 3.6364 under the 25-29 years old.

Among the seven dimensions of service quality, research factor obtained the highest mean score in all the age groups except the oldest group on the satisfaction of students. Tangibles obtained the lowest mean score of satisfaction in all age groups except the oldest age group (45+ years old). The assurance dimension is rated the highest and responsiveness obtained the lowest mean score under the 45+ years old.

Under 20-24 years old, a tangible dimension is the only much satisfied among the seven dimensions of service quality. All the other dimensions from assurance to research factor are considered very much satisfied by 20-24 years old. The 25-29 years old are very much satisfied with all the dimensions of service quality. While the 30-34, 35-39 and 40-44 years old groups are very much satisfied also with all the dimensions of service quality except the tangibles. A general trend of a very much satisfaction on the dimensions of service quality is observed among the age groups except the oldest group. The oldest group of 45+ years old are found much satisfied mostly on the different dimensions of service quality. It is on the assurance and reliability where very much satisfaction is noted with mean scores higher than 3.25.

There are significant mean differences on the levels of satisfaction of students on the services they received from the Graduate School of the University of Baguio when grouped according to age group (p's <.05). Hence, the age group is a factor in the satisfaction of students on the services they received from the Graduate School of the University of Baguio. However, Elias, Hasan, Rahman & Yasoaon (2008) noted that age factor was found with no significant difference on the level of satisfaction hence suggested that age factor cannot be related with the perception of satisfaction. It was further noted that age had no significant relationship with service quality in higher educational settings however for the students from Southern Wesleyan University (SWU) and Western Michigan University (WMU).

All the dimensions of quality service from tangibles to research factor are observed with significant mean differences at 5% level of significance. At most, mean scores on the satisfaction levels of the oldest age group in all the dimensions of service quality are lower than the

mean scores of the younger groups of students. These findings similarly observed on college students attending a live sporting event where their attitudes on service quality change as they grow older (Gonzalez, 2012).

For pairwise comparisons, under tangibles, the following pairs of age groups are with significant mean differences: 20-24 & 25-29 years old, 25-29 & 35-39 years old, 25-29 & 40-44 years old, 25-29 & 45+ years old, and 30-34 & 45+ years old. All other pairs of age groups are with mean differences not significant like 20-24 & 30-34 years old and 20-24 & 35-39 years old.

For assurance dimension of service quality, six (6) mean differences are considered significant while nine (9) are not at 5% level. The significant mean differences are between the following age groups: 20-24 & 25-29 years old, 25-29 & 35-39 years old, 25-29 & 40-44 years old, 25-29 & 45+ years old, and 30-34 & 45+ years old.

On reliability, mean differences between 45+ years old and other age groups except for 35-39 years old are significant. Mean differences between 40-44 years old and other age groups are not significant except 45+ years old. Likewise, other mean differences between other age groups are not significant except between 25-29 & 35-39 years old.

The satisfaction of students on the responsiveness dimension of service quality is found significantly different between 45+ years old and all other age groups. Likewise between 30-34 & 35-39 years old.

Under empathy, there are four (4) not significant mean differences between 20-24 & 25-29, 20-24 & 30-34, 25-29 & 30-34, and 35-39 & 40-44.

For both education and research factors, there are three pairs of not significant mean differences. On education factor, the following are 20-24 & 30-34 years old, 20-24 & 35-39 years old, and 40-44 & 45+

years old. While on the research factor, the pairs of age groups are 20-24 & 30-34 years old, 20-24 & 35-39 years old, and 25-29 & 40-44 years old.

Dominantly, significant differences in the level of satisfaction are observed among the oldest group of students and the other younger age groups. The satisfaction level of the oldest group of students is lower compared to younger groups of students generally in all dimensions of service quality. As older people are more tolerant, less demanding, more respectful of professional authorities and not complaining easily (Rosenheck, Wilson & Meterko, 1997 & Suhonen, Valimaki, Katajisto & Leino-Kelpi, 2006), it does not contribute in attaining the highest level of satisfaction. Thus, the number of years lived is not directly proportional to the level of satisfaction of graduate school students on the different service quality.

Finally, the third factor considered to differentiate perceptions of service quality is course or program.

Table 10

The Level of Satisfaction of Students on the Services Rendered by the Graduate School of the University of Baguio according to Program

	DIMENSION OF SERVICE QUALITY	MPA/MBA (n=45)		CRIMIN (n=2	CRIMINOLOGY (n=27)		ATION 25)
		MEAN	SD	MEAN	SD	MEAN	SD
1.	Tangibles	3.22	.210	3.13	.207	3.15	.164
2.	Assurance	3.53	.106	3.54	.117	3.37	.085
3.	Reliability	3.50	.043	3.50	.080	3.40	.047
4.	Responsiveness	3.42	.069	3.34	.118	3.31	.096
5.	Empathy	3.55	.072	3.47	.063	3.35	.050
The	e Five Generic	3.42	.189	3.37	.219	3.30	.145
Din	nensions of Service						
Qua	ality						
6.	Education Factor	3.49	.061	3.44	.088	3.38	.086
7.	Research Factor (n=36)	3.55	.061	3.79	.064	3.53	.132
ov	ER-ALL	3.45	.169	3.46	.248	3.35	.164

Note: 1.0-1.75-Not Satisfied, 1.76-2.50-Satisfied, 2.51-3.25-Much Satisfied, 3.26-4.00-Very Much Satisfied

Over-all, the mean score is lowest under education while highest under criminology. Though descriptions of these mean scores are still very much satisfied, in terms of values, satisfaction level is highest among the criminology students while lowest among education students.

On the different dimensions, tangibles consistently remained the lowest rated dimension to the groups of students by course or program. The mean scores of tangibles correspond to much satisfaction compared to very much satisfaction in all other dimensions in all groups of students according to course or program. Comparing further the satisfaction of students from the different groups according to course or program, MBA/ MPA students rated empathy the highest in their satisfaction against research factor for criminology and education students.

Considering the course of students, as noted in the p (.000) in all the dimensions of service quality which are much lower than the 5% level of significance, the level of satisfaction on the services rendered by the Graduate School of the University of Baguio differ. Hence, there are no significant differences in the level of satisfaction of students on the services rendered by the Graduate School according to course.

On tangibles, the levels of satisfaction of criminology and education students do not differ (p > .05). However, the levels of satisfaction of students from Master of Public Administration (MPA) or Master of Business Administration (MBA) and Master of Science in Criminology (MSCRIM) or Doctor of Philosophy in Criminology (PhDCRIM) differ likewise between MBA/MBA and Master of Arts in Education (MAED) or Doctor of Education (EDD) or Doctor of Philosophy in Education (PhD). Similarly, students of the Criminology and Education programs do not differ significantly when it comes to their level of satisfaction in the following dimensions: assurance, reliability, and empathy. Under education and research factors, mean differences are not significant between MPA/MBA and Criminology and MPA/MBA and Education respectively. All other pairings, of course, are significant.

A gap analysis is a SERVQUAL methodology for evaluating and managing service quality. Specifically, a gap analysis describes why customers experience low-quality services (Snapsurveys, 2018). In education, Tan & Kek (2004) stated that quality is also determined by the extent to which students' needs and expectations can be satisfied. Since expectations on needs and satisfaction of students on service quality were evaluated, to determine the quality of the services offered by the Graduate School of the University of Baguio, Gap 5 is determined. Gap 5 is the difference between Expectations and Perception of service (Snapsurveys, 2018; Carman, 1990; Parasuman, Zeithaml & Berry, 1994). The satisfaction ratings were compared to their perceptions which relate to their expectations of the service to be offered to them; generally, positive gaps were observed. The gaps represent the amount of dissatisfaction which imply further improvements in the performance of these service quality offered by the Graduate School to students. This is so, the fact that the service quality experienced by the students of the Graduate School did not meet their expectations.

Table 11

The Gap between	n Expectations	and Satisfaction	of Students	on the
Dimensions of Se	rvice Quality			

DIMENSIONS OF SERVICE QUALITY	EXPECTATION	SATISFACTION	GAP SCORE
1. Tangibles	3.2815	3.1760	.1055*
2. Assurance	3.5701	3.4940	.0761*
3. Reliability	3.5636	3.4742	.0894*
4. Responsiveness	3.4963	3.3689	.1274*
5. Empathy	3.5767	3.4755	.1012*
6. Education Factor	3.5616	3.4470	.1146*
7. Research Factor	3.6655	3.6146	.0509*

*Significant at 5% (p's > .05)

Since the mean scores of expectations are greater than the mean scores of satisfaction, positive gap scores are observed. The gap scores are significant (p's <.05) at 5% level. These gaps imply that the service quality rendered by the Graduate School did not fully meet the expectations of its students. Hence, the service received is not as good as noted in Kabir & Carlsson (2010), if the expectations are not met the service will be considered bad. Moreover, if the perceptions about the service users are higher than their expectations on the service they will use, the service is considered excellent, and if the expectations are equal with the perceptions, the service is considered good. Henceforth, the

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Graduate School is to consider meeting the expectations of the students to increase the satisfaction level for continues patronage of the service. This position is supported by what Potluri & Hawariat (2010) stated that customers 'satisfaction is considered as a direct determining factor in customer loyalty, which in turn, increased the purchase of the existing product among others.

The result on higher expectations than satisfaction on the services of the graduate school is similarly reflected in the study of Angelova & Zekiri (2011) however in the Macedonian mobile telecommunication industry.

The highest gaps are under responsiveness, education factor, and tangibles. This result indicates that these are the dimensions of service quality which need priority for improvement (SnapSurveys, 2018). The gap scores also indicate dissatisfaction on the aspects of service quality (Saleh & Ryan, 1991). The reduction of student dissatisfaction and enhancing satisfaction through a suitable standard delivery of services according to Jalali, Islam, & Ariffin (2011) attract new students and retain current students.

The correlation between expectations and satisfaction was obtained and observed to be high (r = .766, p < .05) which is significant. This shows that their expectations of them influence the satisfaction of students on the dimensions of service quality. The positive value of the coefficient of correlation indicates that the increase in the expectations of service quality also increases their satisfaction with it. These results are supported by one of the findings of the study of Almsalam (2014) where customer's expectation had a positive effect on the customer's satisfaction however in Banks of Damascus, Syria. The coefficient of determination (R^2) resulted in 0.5868. This result shows that 58.68% of the variance in the satisfaction is influenced by the variance in the expectations.

= .435 + .850 (Agreement) is significant (p < .05). From this Regression model, if expectations are increased from 3.5209 to perfect 4.0000, then the satisfaction will increase to 3.835 from 3.4280.

Conclusions

The measurement of service performance quality is structured on the difference between the expectations of the services to be offered and the satisfaction with these services received. The quality of the service performance based on students' preferences and their relative satisfaction with the provided quality service can be used to improve the existing services offered. Based on the above premise, the performance was evaluated for further improvement of the service quality of the Graduate School. Since there were positive gap scores in all the dimensions of service quality, expectations were not met, and hence performance is not good. Henceforth, there is a need for the Graduate School to improve satisfaction to meet the demands of students on their services. Increasing satisfaction decreases gaps which in turn led to the improvement of performance. Crucial of the dimensions are responsiveness, education factor, and tangibles. Contributory is the availability of active channels for students to express their complaints, easy contact by phone, organized and appropriateness of readily available course materials, easy access internet/e-mail services, latest printed materials needed or used in the conduct of their services and adequacy of computers for students used. Under education factor, exposure to the real world was prioritized by students among its all other indicators, and it is suggestive to faculty members to consider in their classroom discussions. Hence, the Graduate School should consider the above indicators to further increase satisfaction for better performance. It also became clear that tangibles are the least important dimension of the five generic dimensions of service quality. However, a comment on the classrooms not conducive to learning due to disturbances and noise particularly coming from the

senior high school suggests relocations of classrooms to be considered by the Graduate School to enhance performance further. On the other hand, empathy turned out to be the most important next to the added factor in research. Hence, these dimensions are major contributory factor on students' satisfaction in the service quality of the Graduate School of the University of Baguio.

Age groups and course or program are factors on expectations and satisfaction of service quality, hence to be serviced differently according to their priorities.

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Assessment of the virtual learning environment capability of the Graduate School of the University of Baguio

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Abstract

Higher education establishments around the world are changing their views of delivering education. As information and communication is increasingly conducted online systems have become part of the essential educational infrastructure nowadays. The University of Baguio (UB) has been in the forefront of education in the northern part of the country. With this, to continuously be in the said status, it is the aim of the study to assess the capability of the university to provide a virtual learning environment to its students. Survey questionnaires were floated to the Graduate School students and faculty to determine the user's profile. Inventory assessment were given to the staff and director of the Management Information System department to know the ICT infrastructure in terms of the hardware, network, and software capability of the university. Interviews were conducted to further validate the readiness of the faculty. Rubrics were used to categorize the results that were derived. In terms of the hardware, software and the internet connection, UB is capable of hosting a Virtual Learning Environment (VLE). The students and faculty members were categorized to be "intermediate" users in most of the essential technological

skills required by VLE users such as basic computer operation, file management, word processing and internet use.

KEYWORDS: VIRTUAL LEARNING ENVIRONMENT, E-LEARNING, ICT INFRASTRUCTURE ASSESSMENT, DISTANCE EDUCATION, ONLINE EDUCATION

Introduction

he advancement of technology made a great impact on how people view learning in the 22nd century. Nowadays, the learning environment has become very wide and it is not only limited to the physical area that we traditionally know. The environment can even expand into other countries. Sacchanand (2008) stressed that e-learning is considered a new way of teaching and learning, and an imperative strategy in the educational reform that creates new borderless learning environment and opportunities and brings dramatic changes in the global educational landscape.

New types of educational technologies are emerging at an ever-accelerating pace. The integration of new types of educational technologies allows flexible learning, increased potential for interaction and access to a wide clientele. Supporting Sacchanand's observation, Zakaria, Nor, Ahmed, Abdirahman and Elmi, Ahmed (2012) reiterated that many universities these days are starting to offer web-based courses that supplement and complement traditional classroom-based courses. With the increasing awareness of the capability of the internet, the number of new virtual learning environments (VLEs) is increasing and they have been advertised as being a solution for remote and cross-border education.

Based on the citation by Jung, Insung, Wong, Tat Meng, Li, Chen, Belawati, Tian and Baigaltugs, Sanjaa (2011), Daniel (2003) suggested

that there is ample evidence of distance education (DE) in Asia making great strides with regard to access, equity, and cost-benefit. Over the last few decades, there has been a substantial growth in DE in Asia. There are now at least 10 mega-universities, over 70 open universities, and a growing number of conventional institutions offering DE, as well as a rapidly growing number of private and/or for-profit DE providers operating in Asia (Latchem & Jung, 2009).

Technology is concerned with designing aids and tools to perfect the mind. It has been prominent in communication and learning. The academe has been utilizing technology to its advantage. Teachers normally use technology to teach and facilitate learning. This is evident in the use of gadgets such as LCD projectors to view movies and downloaded recorded video lectures.

In the Philippines, Republic Act (RA) No. 10650 better known as the "Open Distance Learning Act" was approved by President Benigno Aquino last December 9, 2014. In Section 2 of the RA, it is declared that the policy of the State is to expand and further democratize access to quality tertiary education through the promotion and application of open learning as a philosophy of access to educational services, and the use of distance education as an appropriate, efficient and effective system of delivering quality higher and technical educational services in the country.

The Commission on Higher Education (CHED) in its Memorandum Order 006, Series of 2003, recognizes that globalization, changing foreign policies, and liberalization of trade in goods and services worldwide have created a climate for borderless teaching and learning as well as expanded the opportunities for transnational education which includes but is not limited to the establishment of universities and colleges abroad, higher education franchising, and distance education.

In the country, there were several universities that are catering to distance education. The University of the Philippines Open University (UPOU) adopted the Integrated Virtual Learning Environment (IVLE) from the National University of Singapore. The Graduate School of Business of De La Salle University offers two modes of online courses. The first mode is mixed-mode with face-to-face 8 times and web-based 6 times. The second mode is fully online where there is face-to-face for orientation only. The university implemented the "Internet-Enhanced Master of Arts in Teaching Literature Program". Ateneo de Manila University (ADMU) likewise implemented "International eLearning for Professional Journalists". Polytechnic University of the Philippines (PUP) also promotes eLearning.

The list that was provided by Dr. Srisakdi Charmonman should be an inspiration for other universities like the University of Baguio (UB). It has always been the mission and vision of UB to be in the forefront of education in this Northern part of the Philippines. Part of this is for UB to be part of the list of privately-owned universities that offers distance learning especially in the Cordillera Administrative Region (CAR).

In the conference paper entitled "Virtual Learning Environment Implementation Framework of Mariano Marcos State University" that was presented by Wilben Pagtaconan and Cecilia Mercado, Virtual Learning Environment (VLE) refers to the components in which learners and tutors participate in "on-line" interactions of various kinds including on-line learning. Wilson (1996) defines VLE as "computer-based environments that are relatively open systems, allowing interactions and encounters with other participants" and providing access to a wide range of resources.

To create a working virtual learning environment, it is important to consider some key areas such as mandates of higher educational institution pertaining to the educational delivery methods, teaching design and requirements, the functional needs of the course delivery, and the technical skills and needs of the various populations of the students and academics (Nielsen, White, & Zhou, 2011).

This study intends to assess the capability of the University of Baguio (UB) to provide a virtual learning environment to its students. The research therefore, seeks to answer the following questions:

- 1. What is the status of UB in terms of the Information and Communications Technology (ICT) infrastructure and user profiles?
- 2. What is the level of skills of the faculty members in using the ICT infrastructure?
- 3. What is the VLE setting that is appropriate with the current ICT profile of the university?

Methodology

The quantitative-descriptive approach was used in this research.

This study was participated by 124 students and 6 faculty members of the Graduate School. Also, in terms of the infrastructure assessment, the staff and the director of the Management Information System (MIS) of the university were considered.

Data Gathering Tools

To determine the status of the ICT infrastructure in terms of hardware, software and networks of the University of Baguio, the researcher assessed the university's computer architecture, network and internet infrastructure, display screen technologies and peripherals, and



software and information systems with the use of the ICT infrastructure assessment rubric proposed by Mokhtar, Alias and Rahman, (2006). The rubric used in determining the status of ICT infrastructure of UB was based from the implementation of academic computing in Malaysian higher education institutions and were used by Pagtaconan and Mercado (2014) in the VLE readiness assessment for Mariano Marcos Memorial State University.

To determine the current state of UB's ICT in terms of its user profile and the level of skills of the respondents with computer technologies, the researcher adopted the self-evaluation rubric developed by Mankato (Minnesota) Public Schools in 2006. This self-evaluation rubric has been published publicly for educational use.

A semi-structured interview guide was used in determining the level of readiness of the faculty members in utilizing the ICT infrastructure.

Treatment of Data

To answer problem number 1, this study primarily derives its data from the details provided by the Management Information System of the University of Baguio.

Table 1 to 4 provided the descriptive interpretation of the ICT infrastructure of the University of Baguio in terms of the status of the Ratio of computers and internet enabled computers to its users, and level of implementation of its network and internet capacity, display screen technologies and peripherals, software and information system, The overall status of the UB's infrastructure was evaluated using the mean of the responses from the values presented in Table 1 to 4.

Table 1 shows a three-point scale to be used in interpreting the

status of the ICT infrastructure of UB in terms of ratio of computers and internet enabled computers to its users. The ratings were based on the doctoral dissertation conducted by Cate. (2017).

Table 1

Status of UB's ICT Infrastructure in terms of computers and internet enabled computers to its users.

	Status			
ICT infrastructure	Low (1)	Moderate (2)	High (3)	
Ratio of all computers to students	1:9+	1:8 to 1:4	1:3 or better	
Ratio of internet-enabled computers to students	1:9+	1:8 to 1:4	1:3 or better	
Ratio of all computers to academic staff	1:5+	1:2 to 1:4	1:1 or better	
Ratio of internet-enabled computers to academic staff	1:5+	1:2 to 1:4	1:1 or better	

The criteria in interpreting the status UB's ICT infrastructure in terms of network and internet is presented in Table 2. A typical online enabling ICT infrastructure consists of broadband networks, Internet Connection/bandwidth, Collaborative Web Technologies-wireless coverage, Internet Service Provider (ISPs)-network/internet performance (Pima, Odetayo, Iqbal, & Sedoyeka, 2016). The benchmark for a highly 'digitally equipped school' means that a school should have relatively high equipment levels, fast broadband that is having a speed of 10Mbps or more (Wastiau, Blamire, Kearney, Quittre, Van de Gaer, & Monseur, 2013).
Table 2

Status of UB's ICT infrastructure in terms of network and internet.

	Status					
ICT infrastructure	Low (1)	Moderate (2)	High (3)			
Network Specifications	10MB Ethernet or less	100 MB Ethernet	Gigabit Ethernet or better			
Internet Bandwidth	Dialup or broadband up to 1Mbps	Broadband, 2 to 7 Mbps	Broadband, 8 Mbps or better			
Wireless coverage	Less than 25% of learning area	25% to 50% of learning area	More than 50% of learning area			
Network/Internet Performance	Slowness/ unreliability (a frequent problem)	Generally works well, but slow at busy times	Always smooth without appreciable delay			

In the study of Moses, Bakar, Mahmud, & Wong (2012), ICT infrastructure measures the perceived availability and suitability of the ICT tools such as hardware, display screen technologies and peripheral equipment provided in the school. Table 3 is then used to determine the status of UB's ICT infrastructure in terms of display screen technologies and peripherals.

Table 3

Status of UB's ICT infrastructure in terms of display screen technologies and peripherals.

		Status	
ICT infrastructure	Low (1)	Moderate (2)	High (3)
Classrooms equipped with display screen technologies	Less than 25% of classrooms	25% to 50% of classrooms	more than 50% of classrooms
Peripherals	Mostly printers	Printers and other peripherals such as scanners, digital camera and audio/ video recorders	A wide range of peripherals such as printers, scanners, digital cameras, audio/video recorders, portable devices, specialized devices for research and instructional purposes, computer conferencing facilities.

In the study of Law, Pelgrum and Plump's (2001), it is said that ICT infrastructure refers to the availability of software, Internet access and other similar resources in the school. The status of the UB's infrastructure in terms of software and information system is determined using Table 4.



Table 4

Status of UB's ICT infrastructure in terms of software and information system.

		Status	
ICT infrastructure	Low (1)	Moderate (2)	High (3)
Application software	Office applications (word processing, spreadsheets, databases and presentation software)	Office applications, subject specific software, multimedia authoring and video/audio production, web tools	Office applications, subject specific software, multimedia authoring and video/ audio production, web tools, collaborative and conferencing, specialized software for instruction and research
Learning platforms	None available	Web pages on campus Intranet and learning material files stored in public folders on network	Commercial or customized open source learning management system offering a wide range of functions.
Academic/ Student information systems	Academic/ Student data are stored mainly in spreadsheets and databases.	Academic/Student information systems are limited to mainly registration and examination functions. Access is largely limited to administrative staff.	Academic/Student information systems encompass a variety of academic/student functions. Some of the functions have become paperless. Specific functions can be access by staff and students from Intranet/Internet.

To determine the status of UB in terms of its user profiles, the percentage frequency distribution was used. Some of the questions in the survey may have one or more responses.

The qualitative responses from the faculty interviews served as validation from the responses taken under user profile.

Ethical Considerations

Participants gave their consent to participate in the study and were informed of all the details of the process. It was clear to them that no personal information would be revealed nor any kind of harm caused to any of the participants. The faculty members were also told that the study was not intended to focus on assessing their teaching performance and methodologies, but rather on how students reacted to the use of technology and the conditions surrounding the implementation of a VLE.

The results of the assessment will be forwarded to the Executive Committee of the university as well as the Graduate School for its consideration in offering VLE. The results of the study will also be disseminated through a research colloquium to be organized by the Research and Development Center (RDC) of the University of Baguio.

Results and Discussion

This section discusses the findings taken from the survey questionnaire that was floated. Nielsen, Yahya, White, and Zhou (2011) mentioned that to create a working virtual learning environment, it is important to consider some key areas such as mandates of higher educational institution pertaining to the educational delivery methods, teaching design and requirements, the functional needs of the course delivery, and the technical skills and needs of the various populations of the students and academics. Status of UB in terms of the Information and Communications Technology (ICT) infrastructure and user profiles

ICT infrastructure

The status of the ratio of ICT infrastructure of UB in terms of computers and internet-enabled computers to students is high. This is evident in the computer laboratories of the university which has an average of 42 computers in it but its maximum average number of students totals only to 35. Also, each computer in these laboratories is all internet-enabled since the university has a local area network. However, the status of the ratio of ICT infrastructure of UB in terms of computers and internet-enabled computers to the academic staff is low. This is due to the reason that most faculty rooms have a centralized set of computers for their use.

One of the factors that make a virtual learning possible is the presence of a good internet connection even at the server side – the university side. As Mokhtar, et. al (2006) mentioned, "a fast network and higher internet bandwidth allow teaching and learning web-based resources easier to manage. Based on the study of Lee, Chueng and Chen (2005) the new generation has incorporated the Internet into their daily life. According to a collaborative study 93% of college students have access to the Internet. A recent study also found that young people are highly active Internet users. For example, 60% go online to download music, 72% check email on a daily basis. 73% get information for school work, and 28% go online for instant messaging with their friends. Because of their high degree of Internet penetration and adoption the Internet is potentially an excellent medium for teaching and learning.

The status of UB ICT's infrastructure in terms of network and internet is moderate (M = 2.75). The university has subscribed an internet bandwidth of 10 Mbps to serve its constituent better. Also, there were

two providers for its internet connection. The status of UB ICT's in terms of network specification and wireless coverage are high since most of its infrastructure was designed to cater to a bigger bandwidth. There were several hotspots all throughout the campus that include not only the library but the food court and corridors in each school.

The status of the university's infrastructure in terms of display screen technologies and peripherals is moderate (M = 2.0). All the computer laboratory classrooms are equipped with display screen technologies such as liquid crystal display (LCD). LCD's are also available for lecture rooms (if needed) upon reservation from the dean's offices. Printers are available for every computer laboratory and are used by students to print their activities.

The status of the ICT infrastructure of UB in terms of software and information system is moderate (M = 2.7) Also, since the university is offering courses like mass communication and information technology, which requires specialized software such as multimedia and web tools, these too are available and used. The key task of ICT is to provide users with the functionalities they need for the support of their corporate processes. Information Systems (IS) is the main area which represents, in relation to users, more or less the entire ICT area and manages the provided functionalities (Bradová, 2013). An example of functionality is the process of students transacting business in school paperless, having an enrolment system which is done online and other student services which the university is now practicing.

The profile of users play a very important role in the possible implementation of VLE. This is proven by the study done by Miranda, Palves and Morais (2013) which says that the computer skills of the participants in their study were classified into basic skills, intermediate skills, and advanced skills.

The survey result is revealed that the respondents have intermediate skills when it comes to using ICT. Also, most of the respondents can do multi-tasking by running several programs at the same time and are able to organize their files accordingly. They also maximize the use of word processing in most of their communications and are experts in using most of the functions of the tool. They are able to present information and teach, in the case of the faculty, their classes uses a single application program such as a word processor, a spreadsheet, or a publishing program. They utilize the internet by using lists of internet resources and maximize the use of Web search engines to explore education resources. Furthermore they understood the rules concerning the use of e-mail, Internet, copyrighted materials and licenses. In terms of using the spreadsheets and databases, the respondents status skill was classified as beginner as shown by the result of 39 (34.8%) and 58 (50.9%), respectively. This means that they understood how the programs work but do not get the full advantage of it like creating automated computation using spreadsheet macros or creating electronic databases. Information searching for the respondents mean conducting simple searches with electronic encyclopedia and library software for major topics hence they were rated as beginners. Similarly, some of them can create original video tapes for home or school projects thereby classified as beginners. In terms of technology integration, the respondents do not blend the use of computer-base technologies into any of their activities as gathered from comments made during the survey. The users were classified as no capability in this aspect.

The learning management system knowledge of the respondents shows that 36.9% of them do not know what learning management system is and 30.7% have knowledge of what it is while the rest of the respondents left this question blank. The learning management system that is dominant is Edmodo (63%) followed by Moodle (19.6%). Other learning management systems include WebCT, SCORM, Wikispaces, Google Classroom and AIMS, which is the school information system.

Level of readiness of faculty members

From the faculty interviews that were conducted, the respondents have "Advance Capability" in the areas of Basic Computer Operation, Word Processing, Spreadsheet Use, Graphics Use, Internet Use, Telecommunications Use (e-mail), Ethical Use Understanding, Information Searching, and Presentation Skills. Fifty percent (50%) of them are "Beginner" in terms of Database Use. In terms of Video Production and Technology Integration, the respondents are "Intermediate" for both. One of the respondents mentioned that providing a video production facility for the faculty will enable them to further their skill in this area.

The faculty respondents use social media as a way to post assignments to their respective students. It was also identified as a venue for their graduate students to collaborate with other students in the same class. The respondents normally create groups for each class that they have in the graduate school. From the questionnaire that was given, most of the faculty members that were surveyed use learning management system, particularly Edmodo, as a tool side by side with the social media group to post requirements and create quizzes. This was validated further by the faculty members that were interviewed. The other faculty members that were not able to use a learning management system stated that their students complain of inaccessible online content of the course due to slow internet connection.

VLE setting appropriate for UB

Aside from the infrastructure on the client side, the university is also capable of hosting a virtual learning environment as evidenced by the specifications of the servers that it houses.

There are several Learning Management Systems available

in the market. Some of them are open source, meaning they can be used with just the GNU license while others need to be purchased to have a license. UB has always been a proponent of using open source software as evidenced in most productivity tools that it utilizes. Graf and List (2005) in their study came out with nine open source learning management systems that support adaptation issue. These LMS are as follows: ATutor (1.4.11), Dokeos (1.5.5), dotLRN (2.0.3), based on OpenACS (5.1.0), ILIAS (3.2.4), LON-CAPA(1.1.3), Moodle (1.4.1), OpenUSS (1.4) extended with Freestyle Learning (3.2), Sakai (1.0), and Spaghettilearning (1.1). The result of their study implies that among the nine platforms, Moodle obtained the best results in the general as well as in the specific adaptation evaluation.

From literature (Reeves, Herrington, & Oliver, 2005; Wang, Chen & Khan, 2014; Wood, 2010; Sclater, 2008; Aydin & Tirkes, 2010; Kumar, Gankotiya, & Dutta 2011), it can be read that most HEIs use Moodle as a mode of delivering online courses. This is due primarily to the fact the Moodle possesses most of the basic functionality of a good LMS software and it is an open source software. UB has been using Moodle since it was introduced specifically in the School of Information Technology. Although the survey shows that 63% of the respondents have used Edmodo and only 19.6% have used Moodle, both of these are still open source LMS.

Conclusion and Recommendations

Based on the ICT infrastructure assessment of the university which includes computers; network and internet; display screen technologies and peripherals; software and information system, was rated "moderate" in delivering VLE. From the findings, the server infrastructure is well-suited to host a VLE. In terms of user profile, both the students and faculty of the Graduate School were mostly rated to have "Intermediate" ICT skill in aspects necessary in implementing a VLE like basic computer operation, file management, word processing and spreadsheet. Also, the respondents rated as "Beginners" in the other aspects. Although there were only 31.1% among the respondents that were not aware of the use of LMS, they have been exposed in using social media as a way to collaborate and communicate.

The result of the interviews as well as from the user profiles reflect that the level of readiness of the faculty members to use the ICT infrastructure is high. With this, it can be said that they are fit in handling a virtual classroom.

The appropriate VLE setting for UB based on its ICT profile would be the adoption of an open source software since it will not require so much infrastructure at the same time the costs of having a licensed one. Also, since the students are already exposed to social media, adopting to an LMS will no longer become a problem.

Overall, the university can already start offering a virtual learning environment in the Graduate School since the population is not so much yet. Additional trainings on the part of the faculty members in terms of integrating technology to teaching specifically on the use of databases and video will be needed.

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Predictors of the performance of University of Baguio graduates in the Electronics Engineering licensure examination

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Abstract

Studies have shown that students' academic and board exam performances can be predicted by a wide array of factors, both cognitive and noncognitive. This study employed an ex-post facto method, correlation analysis, and stepwise regression analysis to identify factors associated with the academic and board examination performance of UB ECE graduates who took the board examinations from 2011 to 2015. The results revealed fair to average academic performance in the areas of MATH, GEAS, EE, and EST. In the board examinations, the graduates performed poorly in the areas of MATH, GEAS, and EST while they performed fairly in EE. T-test analyses proved that female graduates performed significantly better than the male graduates in academics but showed no significant differences in the board exam in all sub-areas. UB ECE graduates who took the board examinations within two years after graduation got higher mean ratings compared to those who took the board examinations after two years. Correlation and regression analysis proved that students' academic performances were significantly related with board examination performance. The fair to average academic performance of the ECE graduates and poor to fair ratings in the board examination imply a need to enhance further the quality of education provided by the Engineering department. The negative impact of delayed time taking the board exams entails that aside from the role of the learning institution, mental preparation, formal review and proper attitude on the part of the students are also key factors towards successful board examination results.

KEYWORDS: ACADEMIC PERFORMANCE, BOARD EXAM PERFORMANCE, CORRELATION ANALYSIS, ELECTRONICS ENGINEERING

INTRODUCTION

tudents' academic performance occupies a significant role in determining the quality of education offered by academic institutions, which eventually guarantees the efficiency and effectiveness in application of a chosen profession or career (Manalo & Obligar, 2013). It is also considered as a key criterion to judge one's total potentialities and capacities (Nuthana & Yenagi, 2009) which are frequently measured by the examination results.

School leaders use the licensure examination results as a basis for intervention programs to upgrade the quality of academic programs (Pasia, Garzon & Bauyot, 2012). In fact, it is still the most debated topic in higher learning institutions that caused great concern to educators and researchers due to the alarming examination performance of students (Mendezabal, 2013). The performance of the students in the licensure examination reflects the institution's efficiency as well as the intellectual capacity of the students (Manalo & Obligar, 2013). The basis of an institution's claim to quality education is its capability to produce professionals. Qualification to become a professional is usually evidenced by passing the Professional Regulation Commission (PRC) board examination (Ditan, 2008). The Professional Regulation Commission (PRC) is the agency of the Philippine government charged with the regulation and licensing of professionals in the Philippines. Passing the licensure examination given by PRC is one of the most significant achievements in one's life. This examination is intended to prove the graduates' knowledge, progress, skills and qualification in a particular profession (Caringal, 2001).

In the 2010 professional licensure examinations given by the PRC, almost 70 percent of college graduates in the country failed and, in 2012, only 125,419 of the 345,182 or 36.3 percent college and technical school graduates passed their respective professional eligibility examinations as per PRC records. These statistics were based on the results of licensure examinations for 45 groups of professionals. Among the lowest number of passing rates were posted by: elementary teachers (15.4%); secondary teachers (23.3%); electronics engineers (23.5%); and registered electrical engineers (31.9%) (Mendezabal, 2013). During the years 2005 to 2009, national records have shown that the passing rate in licensure examination for electronics engineering (ECE) ranged from 22 percent to 36 percent on the average. This information validates the claim of many graduates that licensure examinations for engineering professions are generally more stringent because of the established cut-off through the years (Forones, 2012).

Multiple reports indicate that academic success cannot be predicted by a single variable. It is dependent upon many factors;

both cognitive and non-cognitive (Mendezabal, 2013). In the study of Forones (2012) involving 47 cases for Civil Engineering (CE) and 176 cases for ECE graduates, it was shown that general education grades, as well as professional subject grades, are significantly related to the board examination ratings of the engineering graduates. The findings of Pachejo and Allaga (2013) revealed that when the board performance is correlated with the three components of the academic subjects, there is a moderate correlation with the general education. On the other hand, the correlation between professional education and specialization indicated a slight correlation. This implies that there is a linear relationship between the three academic subjects and the overall rating of Licensure Examinations for Teachers (LET). In another study by Pasia, Garzon & Bauyot (2012) which aimed to find the factors of performance of San Pedro College graduates in the Medical Technologist Licensure Examination (MTLE), it was demonstrated that all independent variables were correlated with the performance of the graduates in the MTLE, with clinical internship WPA having the highest coefficient of correlation. Further analysis using stepwise regression model revealed that clinical internship WPA is the best predictor for passing the MTLE. Mendezabal (2013) on the other hand, was able to identify a significant relationship between study habits and attitudes and performance in licensure examination. Further analysis revealed that study habits (work methods and time management) of the participants were correlated with their success in licensure examination while study attitudes (i.e., attitudes toward teachers and educational acceptance) were not significantly related to success in licensure examination. This connotes that students who have favorable study habits will likely pass the licensure examination. Gender differences in engineering education have also been associated with the special nature of engineering.

Many studies have been made in the Philippines to define an array of factors related to what determines students' board exam performance, but few studies have been conducted in UB analyzing what factors affect ECE graduates' board exams performance. One study conducted by Hafalla and Calub (2011) involved 64 ECE graduates who took the licensure examinations in 2009. It aimed to profile board passers and non-passers onto the different pre-determined variables and develop a discriminant function model using derived factor constructs from these variables. Results showed that both groups posed the lowest passing rate in the areas of general engineering education and communication of their licensure examination. Results of the factor extraction using orthogonal rotation revealed three underlying factor constructs, namely: student's academic demographics, student's exam demographics and the interval between graduation and exam.

For the past years, UB ECE graduates' board examination performance were consistently below the national passing rate. The case suggests the need to revisit some of the factors previously studied by Hafalla and Calub (2011) which influenced UB ECE graduates' board exam performance. This time taking into consideration more recent board exams results and a non-cognitive factor which is gender. Specifically, this study was conducted to determine the level of academic performance of University of Baguio (UB) Electronics, and Communications Engineering (ECE) graduates in the enrolled General education and Professional courses which are covered in the ECE Board Examinations. In addition, this study aimed to determine which of the graduates' academic course performances are significant predictors of board examination performance. Specifically, the study answered the following research questions.

- 1. What is the level of academic performance of the UB ECE graduates in the different courses enrolled grouped into the following based on the subtests in the board examinations?
 - a. Mathematics (ACAD-MATH)
 - b. General Engineering and Applied Sciences (ACAD-GEAS)
 - c. Electronics Engineering (ACAD-EE)

d. Electronic System Technology (ACAD-EST)

- 1.1 Is there a significant difference in the level of academic performance of the UB ECE graduates according to sex?
- 2. What is the level of Board examination performance of the UB ECE graduates along the following subtests in the Board examinations?
 - a. Mathematics (BOARD-MATH)
 - b. General Engineering and Applied Sciences (BOARD-GEAS)
 - c. Electronics Engineering (BOARD-EE)
 - d. Electronic System Technology (BOARD-EST)
 - 2.1. Is there a significant difference in the level of Board examination performance of the UB ECE graduates according to sex and delay time before taking the board exams after graduation?
- 3. Is there a significant relationship between academic performance and board examination performance?
- 4. Which of the graduates' academic course performances are significant predictors of their Board examination performance?

Methodology

Research Design

The researcher made use of the ex-post facto research method since accessible documents on the academic performance, and ECE Board rating of the University of Baguio Electronics and Communication Engineering graduates who took the board examinations from 2011 to 2015 were analyzed. In addition, a bivariate-correlational method using Pearson moment correlation was utilized to determine the correlation between the graduates' academic performance in Mathematics, General Engineering and Applied Sciences, Electronics Engineering, Electronic System Technology and board examination performance.

Population

This study included UB ECE graduates who took the board exams from April 2011 to October 2015. The population consisted of graduates from March 2004 to May 2015 or those who took the board examinations six months to 11.5 years after graduation. From the master list provided by the Professional Regulation Commission (PRC), 113 students took the board exams during the identified period, 40 of which were re-takers. Since one of the variables considered in this study was the delay time the graduate took the board examinations after graduation, the researcher considered only the latest board ratings of the re-takers. In this regard, this study made use of board ratings from 73 UB ECE graduates only.

Data Gathering Procedure

The final grades of the graduates were obtained from the School of Engineering and Architecture (SEA) Dean's office upon the approval of the Vice-President for Academic Affairs. The gathered data served as bases for the academic performance of the graduates in the different

courses enrolled. The researcher only included the final grades of the students during their first take of the course enrolled. In the University, all failing final grades are encoded as 70. There are no failing grades between 70 and 75. This implies that in this study, if the student failed the enrolled course during the first take, then the recorded grade was 70. On the other hand, all passing grades recorded ranged from 75 to 99. As regards Board examination performance data, the results were also acquired from the master list of examinees with their corresponding performance ratings at SEA Dean's office as certified by PRC. The data included the ratings of the board takers from the four subtests: Mathematics (MATH), General Engineering and Applied Sciences (GEAS), Electronics Engineering (EE) and Electronic System Technology (EST), and the general average. The general average consisted of 20% (Math), 30% EE, 20% GEAS and 30% EST.

Data processing and analysis

To determine the level of academic performance of the UB ECE graduates, mean values were computed from the different courses enrolled which were grouped based on the subtests in the board examinations. For purposes of discussion, the academic performances were coded as follows:

- ACAD-MATH (covering Algebra, Trigonometry, Analytic Geometry, Solid Mensuration, Differential Calculus, Integral Calculus, Differential Equation, Advanced Mathematics, Numerical Methods, Probability and Statistics and Discrete Mathematics)
- b. ACAD-GEAS (covering Physics, Thermodynamics, Vector Analysis, Electromagnetics, Mechanics, Engineering Materials, Strength of Materials, Engineering Economy, Engineering Management, Chemistry, ECE Laws and Ethical Standards and Manual and Code of Ethics)

- c. ACAD-EE (covering Electricity/Magnetism Fundamentals, Electrical Circuits, Solid State Devices, Power Generator/ sources/principles/applications, Electronic(audio/RF) circuit/ analysis/design, Test and Measurement, Microelectronics, Industrial Electronics and Computer Principles
- d. ACAD-EST (covering Signals and Systems, Principles of Communications, Digital Communications, Transmission and Antenna Systems and Data Communications).

Mean values were likewise computed to determine the level of Board examination performance of the UB ECE graduates along the different subtests in the Board examinations. For purposes of discussion in this paper, the four subtests are coded as BOARD-MATH, BOARD-GEAS, BOARD-EE, and BOARD-EST. To provide a qualitative description of the level of academic performance and ECE board examination performance the scales shown in Tables 1 and 2 were used.

Table 1

Description of the academic performance of UB ECE graduates

Grade	Description
95-99	Excellent
90-94	Superior
85-89	above average
80-84	Average
75-79	Fair
74 and below	poor/failed

Levene's test revealed that the variances between the groups were homogenous thus, t-test for independent samples was utilized to answer research problems 1.1. and 2.1. To carry out the t-test analysis for problem 2.1, the graduates were grouped into two based on the delay

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time before taking the board exams after graduation. Since some UB ECE graduates enrolled themselves in a one-year review program before taking the board examinations, group 1 consisted of graduates who took the board exams within two years after graduation. While the second group consisted of graduates who took the board exams more than two years after graduation.

Table 2

Description of the board exam performance of UB ECE graduates

Board Rating	Description
94-100	Excellent
88-93	superior
82-87	above average
76-81	average
70-75	fair
69 and below	poor/failed

To determine if there is a significant correlation between academic performance and board examination performance, Pearson moment correlation was used. The following scale adopted from Cohen (1988), was utilized to interpret the Pearson Product Moment coefficients:

Table 3

Interpretation of the Pearson moment correlation coefficient

Pearson Moment Correlation Coefficient	Interpretation
0 to -/+ .09	trivial or very small relationship
-/+ .10 to -/+ .29	small (weak) relationship
-/+ .30 to -/+ .49	medium (moderate) relationship
-/+ .50 to -/+ 1.0	large (strong) relationship

To determine which among the academic course performances are significant predictors of the Board examination performance stepwise linear regression analysis was performed. Stepwise linear regression is a method of determining which among the independent variables are significant predictors of the dependent variable.

Ethical Consideration

Upon the approval of the Vice President for Academic Affairs and the Director of the Registrar's office, the academic records and board examination ratings of the target population were accessed through SEA Dean's office. To maintain the confidentiality of information, only the Dean's office personnel accessed the academic records of the students through the University's online grading system. The print-outs of the academic records as well as the photocopy of the board ratings provided by the Dean's office did not reflect the names of the students. To match the academic records with the students' board ratings, letters were used to code the students. The researcher assured that all data gathered from the said office were only used for this current research. The results of this study will be disseminated through research journal publications and public lectures to the different stakeholders of the University. No names will be revealed in the presentation of results. The information obtained about each student will be kept private and confidential. The personal information will not be revealed and only generalization in the recommendations shall be disclosed.

Results and Discussion

Level of Academic Performance of UB ECE Graduates

Most higher education institutions offering Engineering programs

conduct examinations as entry requirement to assess the mathematical skills of incoming freshmen students. Such requirement sprung from the fact that most subjects in Engineering involve complicated manipulation of numbers, critical thinking and problem solving. Engineering is different from other disciplines because of its strong focus on mathematics and physics, combined with a range of domain specific abilities and knowledge (Loo & Choy, 2013).

Table 4 shows that UB ECE students who were part of the study had the highest mean in the area of ACAD-MATH, but with value interpreted only as "average". One reason that can explain the result is that UB does not conduct a screening examination for incoming Engineering students. Thus, enrollment in the program for most students, is simply based on their interest or their strong and positive judgment about their prior knowledge in mathematics. Such judgments were mainly based on actual experience while solving mathematics problems in high school. Because of UB's open-door policy, some students who were admitted in the program do not possess adequate skills to meet the demands of the courses in the Engineering program requiring critical thinking and problem-solving skills. Since most of the Math courses are offered in the first two years of the Engineering program, then admitted students simply rely on their mathematical skills and knowledge acquired in high school. The "average" performance in MATH therefore implies that students did not possess adequate mathematics preparedness when they enrolled in Engineering. The result emphasizes that mathematics preparedness is highly important to this admitted Engineering students to perform well in college. As such, this implies that if a student has strong background in mathematics, he might be able to do well in engineering subjects (Loo and Choy, 2013). Bischof & Zwolfer (2015) shows a connection between preparedness for college mathematics and the prospect of earning an Engineering degree. As pointed out by Ismail, Nopiah, Asshaari, Othman, Tawil & Zaharim (2012) mathematics is a key topic supporting a large number of engineering courses. Consequently, it is important for engineering students to hold a strong mathematics knowledge that can keep their motivation for reasonable progress of their engineering programs. This is verified by a study of about 44,000 students which found out that engineering students had higher high school SAT-math scores than the overall student average (De Winter and Dodou, 2011).

General education and applied sciences courses like Physics, Chemistry, Thermodynamics and Mechanics are mathematically oriented subjects. Thus, in most GEAS courses, Math courses are the prerequisites. The result in Table 5 which shows an "average" level of academic performance in GEAS is an indication of the mathematical skills possessed by the students. This is reflected by the study of Bischof & Zwolfer (2015) which showed that there is a significant positive correlation between the mathematics and mechanics grades. They further emphasized that the under-preparedness of first-year university students in the mathematics classes can actually propagate into mathematicallyoriented courses like Engineering Mechanics, Strength of Materials, Thermodynamics, Fluid Mechanics, and Control Engineering. A connection between mathematics and other engineering core subjects also exists but is, in general, less distinct (Bischof & Zwolfer, 2015).

Table 4

Academic	Performance	of UB	ECE	Graduates
	./			

Area	Mean	Std. Dev.	Descriptive Interpretation
ACAD-MATH	80.11	4.33	Average
ACAD-GEAS	79.63	4.02	Average
ACAD-EE	77.16	2.94	Fair
ACAD-EST	76.73	3.00	Fair
ACAD-Gen. Average	78.41	3.27	Fair

The "fair" level of academic performance in ACAD-EE and ACAD-EST are explained by the fact that the professional courses

are included in these areas which are generally considered difficult for Engineering students. Since more laboratory courses are offered in the higher years, for some students, the difficulty lies in finishing projects as part of the requirements of the enrolled course. In addition to the mental preparedness of the students, the "Fair" to "Average" level of academic performance of the ECE students in the four areas and the overall mean (as shown in Table 4), can be linked to the grading system of the University. The University implements a 70% cut-off score in all courses in the college level. This means that for a student to obtain at least 75 passing grade, he/she must be able to get at least 70% of the total scores from all activities in class. Such grading system, according to students makes it hard for them to get an 80 and above grades. As discussed in the data gathering procedure, all failing final grades are encoded in the grading system as 70, even if the computed grade is 71, 72, 73 or 74. So for students who failed the enrolled course during the first take, the value included in the computation of the mean academic performance per area was 70. Consequently, such value brought the mean academic performance lower. Profile of the students revealed that most of the students incurred failing grades at least once throughout their academic years. This further explains the "fair" overall level of academic performance of the students.

Although the teaching performance of the faculty members was not covered in the study, the academic performance of the students can also be a reflection of the teaching performance of faculty members handling the different subjects. According to Mateo (2011), the teacher is the most critical factor in attaining a quality education and the single most potent element in the complete structure of an effective mathematical program. As other researchers have pointed out, the teachers are the primary cause of students' failure in mathematics. Poor performance in the subjects can be traced back to the teachers' failure to impart the necessary knowledge, skills, attitudes, and values to the students (Ganal & Guiab, 2014).

Table 5

Academic performance of UB ECE Graduates according to sex

	Male (n = 65)			Female (n = 8)		
Area	Mean	Std. Dev.	D.I.	Mean	Std. Dev.	D. I.
ACAD-MATH	79.73	4.18	Average	83.23	4.55	Average
ACAD-GEAS	79.27	3.72	Fair	82.55	5.32	Average
ACAD-EE	77.02	2.89	Fair	78.30	3.29	Fair
ACAD-EST	76.47	2.91	Fair	78.88	3.02	Fair
ACAD- Gen. Average	78.12	3.10	Fair	80.74	3.88	Average

Legend: DI = Descriptive Interpretation

Table 5 presents the academic performance of ECE students when grouped according to sex. As revealed, female UB ECE students performed better in all areas than male UB students. Previous studies have shown that gender differences in engineering education are associated with the special nature of engineering. A variety of predictors including men's mathematical and spatial abilities, and women's verbal abilities and lower self-assessment, confidence, and self-efficacy have been used to explain women's underachievement in engineering programs (De Winter and Dodou, 2011). In this current study, however, when students' academic performances were compared according to gender, UB ECE female students got higher mean ratings in all four areas than male students.

Table 6

Comparison of the academic performance of ECE students according to sex using t-test

Area	Sex	n	Mean	t-value	df	p-value
ACAD-MATH	Male Female	65 8	79.73 83.23	-2.210	71	.030*
ACAD-GEAS	Male Female	65 8	79.27 82.55	-2.242	71	.028*
ACAD-EE	Male Female	65 8	77.02 78.30	-1.163	71	.249
ACAD-EST	Male Female	65 8	76.47 78.88	-2.204	71	.031*
ACAD-Gen. Average	Male Female	65 8	78.12 80.74	-2.196	71	.031*

*Significant at .05 level

As revealed in Table 6, there are significant differences in the academic performance between male and female students in the areas of Mathematics, General Engineering and Applied Sciences, Electronic System Technology and the General Average, p < .05. Specifically, female students performed better than male students. The result implies that female students possessed more mathematical knowledge and higher self-efficacy than male students to fulfill the requirements in MATH, GEAS, and EST. The result is supported by the study of Forones (2012) which showed that there was a significant difference in the proficiency level in Science of the Engineering graduates when grouped according to gender. It shows that their performances significantly differ in favor of the females. This implies that females perform better in Science than males. The result is also aligned with the findings of Hessels and Hannover (2008) that girls performed better in science subjects like physics. Although the reason is not associated to gender but more on the classroom set-up where the girls are not mixed to boys because they

feel more confident in their abilities in Science subjects and have better self-concept about these subjects.

In the area of mathematics, the results of the study, however, contradict the findings of Forones (2012) which compared the proficiency level in Math of the Engineering graduates when grouped according to gender. It was noted that there was no significant difference in the proficiency level between males and females. This implies that the performance of a female graduate in Math is at par with that of their male counterpart. The result of the study of Forones (2012) also conforms to the findings of the study conducted by Mertz and Kane (2012) that man does not perform better in math than females due to a gender disposition. They attributed the difference in math performance to social and cultural factors, not difference in biology. They have noted that boys, as well as girls, tend to do better in math when raised in countries where females have better equality.

On the other hand, several studies have shown that males do better than females on tests of mathematical ability, but conversely, females do better than males at tests involving verbal ability (Camello, 2014). The research of Kiamanesh & Mahdavi-Hezaveh (2003) indicated that males outperformed females in math achievement at the junior high and high school levels. There were also significant differences in attitudes toward math between the two groups. According to Farooq and Shah (2014), females do not prefer mathematics at a higher level because they perceive it as a male domain. Male community dominates all professions requiring higher level knowledge of mathematics. Many barriers are there for the female students to have their career in mathematics.

Board Examination Performance of UB ECE Graduates

Table 7 shows the board exam performance of the UB ECE graduates. The table revealed that the graduates performed poorly in the

areas of MATH, GEAS, and EST with mean ratings below the passing rate of 70. On the other hand, UB ECE graduates performed fairly in Electronics Engineering (EE). This implies that a higher percentage of the board exam takers failed. The results mirror the report of the Professional Regulation Commission in 2010 that during the years 2005 to 2009, national records have shown that the passing rate for electronics engineering (ECE) revealed a range of 22 percent to 36 percent (Professional Regulation Commission, 2010). This information validates the claim of many graduates that licensure examinations for engineering professions are generally more stringent because of the established cutoff through the years (Forones, 2012). The results of the study are quite consistent with the findings of Hafalla and Calub (2011) involving 64 UB ECE graduates who took the 2009 licensure examinations. The results showed that the lowest passing rate is on the areas of general engineering education and communication of their licensure examination.

Table 7

Board examination performance of UB ECE graduates

		-	-
Area	Mean	Std. Dev.	Descriptive Interpretation
BOARD-MATH	68.42	15.22	Poor
BOARD-GEAS	68.67	12.47	Poor
BOARD-EE	74.62	10.45	Fair
BOARD-EST	68.85	11.87	Poor
BOARD-Gen. Average	70.49	10.58	Fair

The study of Laguador & Dizon in 2013 involving the academic achievement in the different learning domains and performance in the licensure examination for Engineers revealed different results compared to the study. Electronics engineering examinees obtained highest average score in Mathematics (73.5%) subject followed by Electronics Engineering subjects (72.7%) while Electronic Systems and Technology (68.0%) and General Engineering and Applied Sciences (66.7%) obtained the lowest ratings. It was also revealed in the study of Tamayo and Cañizares (2014) that ECE students were standing on a loose ground for general electronics and applied science and in electronic science and technology subject, while the strength is observed on mathematics and electronics subject clusters. As emphasized by the authors, the results suggest that the program holds a strong background in basic electronics and in engineering mathematics but, was finding some difficulty in general practice and application in science and technology.

Despite having "fair" to "average" academic performance, UB ECE graduates revealed "poor" to "fair" board exam performance. The disconnection between the graduates' academic and board examination performances can be explained by the study of Mendezabal (2013) that academic success is dependent upon many factors; both cognitive and non-cognitive. Thus, in the case of UB ECE graduates, the board examination performance may be attributed to their study habits and attitude during the review period or classes prior to taking the board examination. As clearly shown in the study of Mendezabal (2013), there was a significant relationship between study habits and attitudes and performance in licensure examination. Further analysis revealed that study habits (work methods and time management) of the participants were correlated with their success in licensure examination while study attitudes (i.e., attitudes toward teachers and educational acceptance) were not significantly related to success in licensure examination. This connotes that students who have favorable study habits will likely pass the licensure examination. As recommended by Forones (2012), it must be instilled to the minds of Engineering graduates the critical roles that mental preparation and formal review play in the board examination or any professional validation of one's knowledge and training must be considered seriously as well.

Table 8 revealed that when the graduates' board examination performances were compared according to gender, female graduates got

higher mean ratings than male graduates in all sub-areas. These findings are parallel to the results shown in Table 2 wherein female students produced better academic performance than the male counterparts. Such pattern shows that academic performance is associated with board exam performance.

Table 8

Board examination performance of UB ECE graduates according to sex

	Male (n = 65)			Female (n = 8)		
Area	Mean	Std. Dev.	DI	Mean	Std. Dev.	DI
BOARD-MATH	67.51	15.45	Poor	75.88	11.43	Average
BOARD-GEAS	68.65	12.19	Poor	68.88	5.32	Poor
BOARD-EE	74.37	10.79	Fair	76.63	7.31	Average
BOARD-EST	68.23	12.28	Poor	73.88	6.17	Fair
BOARD-Gen. Average	70.10	10.82	Fair	73.65	8.28	Fair

Legend: DI = Descriptive Interpretation

Despite the female graduates having mean ratings higher than the male graduates, t-test analysis as shown in Table 9, revealed that there are no significant differences in the board exam performance between male and female students in all sub-areas (p > .05). The results are parallel to the findings of Forones (2012) which showed that female Engineering graduates have the same level of performance with that of their male counterpart.

Table 9

Comparison of the board examination performance of ECE students according to sex using t-test

Area	Sex	n	Mean	t-value	df	p-value
BOARD-MATH	Male Female	65 8	67.51 75.88	-1.479	71	.144
BOARD-GEAS	Male Female	65 8	68.65 68.88	049	71	.961
BOARD-EE	Male Female	65 8	74.37 76.63	574	71	.568
BOARD-EST	Male Female	65 8	68.23 73.88	-1.275	71	.207
BOARD-Gen. Average	Male Female	65 8	70.10 73.65	894	71	.374

Table 10 shows that UB ECE graduates who took the board examinations within two years after graduation got higher mean ratings in all sub-areas compared to those who took the board examinations after two years. Most Engineering graduates allot a year or two to prepare for the board examinations usually by enrolling in a review program or by self-review. A few, on the other hand, chose to work immediately after graduation. For the latter, some try their luck taking the board examination, while working, even without enough preparation. In most cases, the reason for taking the board examinations is to get a license for promotion purposes. Even those who take the board examination within two years, when they fail, they apply for any job available and later on take the risk of taking the board examination even without enough mental preparation. In most instances, those who took the board examination while working or those who did not take the board examinations immediately after graduation failed the exams. Dr. Joseph Auresenia, the Chemical Engineering Department Chair of De la Salle University, explained that graduates while working, might forget about what they have learned from the University (Ng and Lojo, 2011).

Table 10

Board examination performance of UB ECE graduates according to delay time board examination was taken after graduation

	Within two years (n = 51)			After two years (n = 22)			
Area	Mean	Std. Dev.	DI	Mean	Std. Dev.	DI	
BOARD-MATH	72.06	11.40	Fair	60.00	19.45	Poor	
BOARD-GEAS	71.87	9.81	Fair	61.27	14.91	Poor	
BOARD-EE	77.24	8.49	Average	68.55	12.14	Poor	
BOARD-EST	71.39	8.93	Fair	62.95	15.52	Poor	
BOARD-Gen. Average	73.44	7.80	Fair	63.65	13.00	Poor	

Legend: DI = Descriptive Interpretation

Table 11 reveals that there are significant differences in the mean ratings of ECE board takers when grouped according to the delay time board examinations were taken after graduation (p < .01). The finding of the study is verified by the results of Morgan (2015) which revealed that there is a relationship between average delay after graduation before sitting for the Certified Public Accountant (CPA) exam, and average institutional CPA exam pass rates. Data suggest delay in taking the CPA exam has a significant negative relationship with institutional CPA exam pass rates. In 2012, Malangoni, Jones, Rubright, Biester, Buyske, and Lewis, Jr. investigated whether candidates who delayed taking the American Board of Surgery (ABS) Qualifying Examination (QE) had worse performance on the examination. The results demonstrate that candidates who delayed taking the QE immediately are at extremely high risk for exam failure and failure to achieve board certification. These findings according to the authors, presumably are due to deterioration of knowledge over time, but they also may represent characteristics of the Delay group that are currently undefined. Another study conducted by Marco, Counselman, Korte, Purosky, Whitley, and Reisdorff, in

2014 determined if a delay in taking the American Board of Emergency Medicine (ABEM) is associated with poorer performance. The results of the study implied that delay taking the qualifying examination was associated with poorer performance. On the other hand, the study of Hafalla and Calub (2011) revealed that there are marked significant differences between passers and non-passers on their grade point average, number of failed subjects and the number of repeats of taking the board exam. On the other hand, the time interval between those takes and the time interval between their graduation to their first take did not pose significant differences.

Table 11

Comparison of the board examination performance of ECE students according to delay time taking the board exams, using t-test

Area	Years	n	Mean	t-value	df	p-value
BOARD-MATH	w/in 2 yrs. After 2 yrs.	51 22	72.06 60.00	3.314	71	.001**
BOARD-GEAS	w/in 2 yrs. after 2 yrs.	51 22	71.87 61.27	3.593	71	.001**
BOARD-EE	w/in 2 yrs. after 2 yrs.	51 22	77.24 68.55	3.508	71	.001**
BOARD-EST	w/in 2 yrs. after 2 yrs.	51 22	71.39 62.95	2.930	71	.005**
BOARD-Gen. Av- erage	w/in 2 yrs. after 2 yrs.	51 22	73.44 63.65	3.979	71	.000**

**Significant at .01 level

Correlation between academic performance and board examination performance

Table 12 shows that students' academic performance in the four sub-areas are significantly correlated with board examination performance (p < .05). The strength of the relationship ranged from weak

to moderate. The results of the study are aligned with the findings of Forones (2012) which involved 47 Civil Engineering (CE) and 176 cases for ECE graduates. It was also shown that general education grades are significantly related to the board examination ratings of the Engineering graduates. Also, the professional subject grades are significantly related to the board examination rating graduates. The academic performance grades are significantly related to the board examination ratings of the engineering graduates.

Table 12

Pearson Correlation analysis between academic performance and board examination performance

School's Academic Performance	Board Exam Performance	Pearson Correlation Coefficient	Descriptive Interpretation	p-value
ACAD-MATH	BOARD-MATH	.426	Moderate Relationship	.000**
ACAD-GEAS	BOARD-GEAS	.321	Moderate Relationship	.006**
ACAD-EE	BOARD-EE	.287	Weak Rela- tionship	.014*
ACAD-EST	BOARD-EST	.390	Moderate Relationship	.001**
ACAD-Gen. Average	BOARD-Gen. Average	.420	Moderate Relationship	.000**

* Significant at .05 level

**Significant at .01 level

It was also observed in the study of Tamayo and Cañizares (2014) that to pass the board examination for ECE, the applicant must obtain good grades in the following subjects: mathematics; electronics; general electronics and applied science; and electronics science and technology.

The current study revealed that students' academic performance

in mathematics (ACAD-MATH) produced the highest Pearson correlation coefficient with BOARD-MATH, thus strengthening literature results which emphasized the importance of college mathematics in Engineering education. As McCormick & Lucas (2011) pointed out, in general, preparedness for college mathematics is strongly correlated with the prospect of earning an Engineering degree. Generally, mathematics and the field of engineering are closely knitted because both subjects involve complicated manipulation of numbers, critical thinking and problem solving. Furthermore, studies have shown that mathematics was correlated with engineering academic achievements. As such, this seems to imply that if a student has a strong background in mathematics, he might be able to do well in engineering subjects (Loo and Choy, 2013).

The result of this study further implies that when students possess a good understanding of mathematical concepts, they will be more competent working as Engineers. As presented in several literatures, the competence of engineers rests to a large extent on their mathematical training, since mathematics is not only a set of tools to model and analyze systems; it also provides training in logical reasoning. Within an online survey involving more than 5700 registered engineers, Goold and Devitt (2012) found out that, while almost two thirds of engineers use high level curriculum mathematics in engineering practice, mathematical thinking has even greater relevance to engineers' work. Despite mathematics' importance, Goold and Devitt (2012) pointed out that there are problems associated with the role of mathematics in engineering education, in particular, related to attracting and retaining students in engineering degree programs.

Predictors of Board Examination Performance

The purpose of the stepwise regression analyses in this study was to predict a single variable from one or more independent variables. For the analysis of BOARD MATH, the p-value associated with ACAD-

MATH was significant at 0.01 level. Interestingly the result implies that only ACAD-MATH can significantly predict BOARD-MATH. Stepwise regression further revealed the following: only ACAD-EST can significantly predict BOARD-GEAS; only ACAD-GEAS can significantly predict BOARD-EE; only ACAD-EST can significantly predict BOARD-EE; only ACAD-EST can significantly predict BOARD-EST, and only ACAD-GEAS can significantly predict BOARD-GEN.AVE. The following regression models are therefore established:

MODEL 1: BOARD-GEN. AVE = -19.073 +1.125*ACAD-GEAS

Model 1 shows that the BOARD-GEN. AVE is -19.073 when ACAD-GEAS is zero. An increase of one unit of ACAD-GEAS will bring about 1.125 units of BOARD-GEN. AVE. In addition, the step wise regression analysis yielded a Multiple Regression Coefficient (R) of .427, a multiple R square of 0.182 and adjusted R square of 0.171. This means that 17.1 % of the variance in students' BOARD-GEN. AVE can be explained by the influence of ACAD-GEAS. Analysis of variance for the multiple regression data produced an F-ratio of 15.840 which is significant at the 0.05 level. This indicates the effectiveness of the ACAD-GEAS in predicting students' BOARD-GEN.AVE.

MODEL 2: BOARD-MATH = -51.534 + 1.497* ACAD-MATH

Model 2 shows that the BOARD-MATH is -51.534 when ACAD-MATH is zero. An increase of one unit of ACAD-MATH will bring about 1.497 units of BOARD-MATH. The analysis yielded a Multiple Regression Coefficient (R) of .426, a multiple R square of 0.182 and adjusted R square of 0.170. This means that the influence of ACAD-MATH can explain 17.0 % of the variance in students' BOARD-MATH. Analysis of variance for the multiple regression data produced an F-ratio of 15.755 which is significant at the 0.05 level. This indicates the effectiveness of the ACAD-MATH in predicting students' BOARD-MATH.

MODEL 3: BOARD-EE = -2.579 +.969* ACAD-GEAS

Model 3 shows that the BOARD-EE is -2.579 when ACAD-GEAS is zero. An increase of one unit of ACAD-GEAS will bring about .969 units of BOARD-EE. The analysis yielded a Multiple Regression Coefficient (R) of .373, a multiple R square of 0.139 and adjusted R square of 0.127. This means that the influence of ACAD-GEAS can explain 12.7 % of the variance in students' BOARD-EE. Analysis of variance for the multiple regression data produced an F-ratio of 11.473 which is significant at the 0.05 level. This indicates the effectiveness of the ACAD-GEAS in predicting students' BOARD-EE.

MODEL 4: BOARD-GEAS = -51.407 + 1.565*ACAD-EST

Model 4 shows that the BOARD-GEAS is -51.407 when ACAD-EST is zero. An increase of one unit of ACAD-EST will bring about 1.565 units of BOARD-GEAS. The analysis yielded a Multiple Regression Coefficient (R) of .377, a multiple R square of 0.142 and adjusted R square of 0.130. This means that the influence of ACAD-EST can explain 13.0 % of the variance in students' BOARD-GEAS. Analysis of variance for the multiple regression data produced an F-ratio of 11.746 which is significant at the 0.05 level. This indicates the effectiveness of the ACAD-EST in predicting students' BOARD-GEAS.

MODEL 5: BOARD EST = -49.419 + 1.541*ACAD-EST

Model 5 shows that the BOARD-EST is -49.419 when ACAD-EST is zero. An increase of one unit of ACAD-EST will bring about 1.541 units of BOARD-EST. The analysis also yielded a Multiple Regression Coefficient (R) of .390, a multiple R square of 0.152 and adjusted R square of 0.140. This means that the influence of ACAD-EST can explain 14.0 % of the variance in students' BOARD-EST. Analysis of variance for the multiple regression data produced an F-ratio of 12.737

which is significant at the 0.05 level. This indicates the effectiveness of the ACAD-EST in predicting students' BOARD-EST.

Conclusions and Recommendations

The fair to average academic performance of the ECE graduates implies the need for the University to enhance the mental preparedness of the students entering the Engineering program. The poor to fair ratings in the board examination further suggests a need to improve the quality of education provided by the Engineering department to better prepare the students for the licensure examinations and their future careers. The significant correlation between academic performance and board exam ratings further suggests that the readiness of the engineering graduates to take the licensure examination is initially influenced by the mathematical preparedness of incoming Engineering students and eventually influenced mainly by the learning institution. The significant differences in the academic performance of the female and male students pose a challenge among faculty members in the Engineering department to reflect on their teaching strategies to address the need of both sexes. The result showed the negative impact of delayed time taking the board exams in the success rate of the students. This further entails that aside from the role of the learning institution, mental preparation, formal review and proper attitude, or willingness to learn on the part of the students are also crucial factors towards successful board examination results. As reflected in the regression analysis, in general, less than 20% of the variability in students' board exam performance can be explained by the influence of the academic performance. This connotes that the board examination performance may be attributed to other non-cognitive factors like study habits and attitude during the review period or classes prior to taking the board examination.

Based on the results of the study, the following recommendations are made:

- The University must conduct entrance examinations for an initial assessment for incoming Engineering students to assess their mathematical skills, a highly significant factor in Engineering education success;
- 2. Standardized assessment or evaluation tools to be utilized in General education and Professional courses, with content aligned or extracted from board examination questions;
- 3. Development of instructional materials designed explicitly for UB ECE students' need;
- 4. Trainings for faculty members to improve teaching strategies and methodologies so that the academic performance of the students will be improved, to address concerns from both sexes;
- 5. Improvement of the School's retention policy so that only students who are mathematical oriented and with good study habit will be allowed to move up the next level or be allowed to graduate, or to determine who are board exams ready;
- 6. Seminars must be regularly conducted to address the noncognitive factors associated with successful board exams results like developing students' proper habits and attitude during the review period or classes prior to taking the board examination, and reducing test taking anxieties;
- 7. Enhancement of the embedded review program so that students will be re-oriented on the topics learned during Engineering years.

- 8. Refresher programs must also be provided to graduates who have been away from the academic environment before they will be allowed to take the board exams, and;
- 9. School administrators and faculty members must also bear the responsibility to periodically identify problems commonly faced by Engineering students so that they can achieve the competencies needed to prepare them for the board exams and future careers.

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The University of Baguio Graduate student's concept of success

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Abstract

Knowing people's concept of success may help in understanding their motivations for their actions as human living is purpose driven. This study is aimed to determine the concept of success from among the graduate school students of the University of Baguio. Specifically, it looked into success's nature; aspects that helped influenced its formulation; the manner it is achievable; and finally their reactions once it is unachieved. The phenomenological method was used in gaining the insights from the respondents through individual interview using the guide questions as well as using questionnaire. The results reveal that as to its nature, success is about achieving a goal through hard work. For a few, success is understood as the capacity to enjoy or being contented. The family is the most influential in the formulation of the concept and to a lesser degree, education the community and one's free choice. Most respondents believed success could be attained through one's effort while a few believed it is a matter of natural course. Success is mostly believed to be attained in many ways rather than achieved at the end of one' life. The respondent's reaction when success is unachieved is tolerant and accepting of reality. The following conclude the results of the study: there are different existing concepts of success; there are many factors outside the individual other than the family that is now influential in its formulation; the Western view of success, i.e., as a goal to achieve had greater influence as regards

the concept of success compared to the Eastern view which comes as a natural outcome; success is very much achievable in the immediate sense and rather than achieved at the end of one's life, and the respondents' resilience was apparent amidst their challenges.

KEYWORDS: GRADUATE SCHOOL STUDENTS, SUCCESS, PHENOMENOLOGICAL METHOD

Introduction

o what is considered a goal in life for individuals and a community and to what makes it worthwhile to pursue makes the concept of success truly an interesting aspect of studying about human life. The definition of success is the status of having achieved and accomplished an aim or objective. Success is gaining of fame or prosperity (Mueller, 2017). Being successful means the achievement of desired visions and planned goals (Mueller, 2015), or the pre-planned outcome of the exertions applied (Petryshyn, 2014).

The word success came from the Latin noun successus which means "an advance, coming up, a good result or a happy outcome." The Latin verb is succederre which means to come after (Harper, 2017). It is very close to the other definitions of success by Petryshyn (2014) such as: "what will come." Or in French fortunate as a passive mediative expectation or the what-will-follow the actions; the completion of the actions; the what-will-come (after): "come, what may" - the fate; the expectation, hope for some positive outcome with some doubts and prejudices. The two distinct views of success are: Success as a natural outcome and success as an outcome brought about by a defined goal achieved through one's effort. The former concept is most likely to be associated with the Eastern view while the latter is most akin to the Western view. The most common criteria for defining the concept of success are the following:

A. Traditional Asian Views

- 1. Success as wealth and prosperity: The translation of success in Hindu is Artha- which means prosperity in worldly pursuits. The artha is the first goal in Hindu life, although the ultimate goal of Hinduism is enlightenment, the pursuit of wealth and prosperity means an appropriate pursuit for the householder (the second of four life stages) (Jayaram, nd).
- 2. Success can also be one's fate, or one's destiny, according to Mahatma Gandhi, although it is brought about by one's mindset towards a goal. Positive beliefs will lead to one's thoughts, words, actions which turn to one's habits and habits turns to values which in turn help one attain one's destiny (Goodreads, nd). Success is fulfilling one's goal which is the expansion of happiness or the progressive realization of worthy goals (Chopra, 2016). For the Vietnamese Buddhist Hanh, success is the fulfillment of a goal which may not necessarily lead to happiness. Success may not all the time to mean happiness. As he expressed: If you want success, you may sacrifice your happiness for it. You can become a victim of success, but you can never become a victim of happiness."(Hanh, 2014).
- 3. Success as related to achievement and winning within the person or inside the person. The Eastern principles rest in "the winning inside" or the gaining of victory over oneself as said by the following Eastern philosophers: "Though he should conquer a thousand men in the battlefield a thousand times, yet he, indeed, who would conquer himself is the noblest victor." ~ Buddha; "He who conquers others is strong; he who conquers himself is mighty." ~ Lao Tzu. "The most excellent Jihad is that for the conquest of self." Mohammad The goal and key to success are spiritual or non-material as shown in the following sayings: "Virtuous life and adherence to performing your duties." ~

Confucianism "If you want everything, then give up everything." ~ Lao Tzu and "He is able who thinks he is able." ~ Buddha (Bibikova & Kotelnivkov, nd)

B. Western views and the contemporary meaning of success:

- Western View of success related to achievement and winning is more on outside one's self. The following sayings are examples: "You're not a star until they can spell your name in Karachi." by Roger Moore. Also, "Life affords no higher pleasure than that of surmounting difficulties, passing from one step of success to another, forming new wishes and seeing them gratified." by Samuel Johnson (As cited in Bibikova and Kotelnikov, nd)
- 2 The goal and key to success for the Westerns is an achievement brought about by hard work as shown with the following sayings: "The secret of success in life, and subsequently of making money, is to enjoy your work. If you do, nothing is hard work – no matter how many hours you put in." (Sir Billy Butlin) ; "Success is that old ABC – ability, breaks, and courage." By Charles Luckman; "Flaming enthusiasm, backed by horse sense and persistence, is the quality that most frequently makes for success." By Dale Carnegie; "Success is 1% inspiration, 99% perspiration." By Inventor Thomas Edison (As cited in Bibikova and Kotelnikov, nd).

"Success as money and what money can buy...." Americans tend to define success by money, and by what money can buy. We are known around the world as a rather materialistic country, always striving after things and defining success by the accouterments that money can buy – such as our snazzy cars, the size of our homes and designer clothes. And that's just what we get – more things. It doesn't mean more fulfillment or contributing to make the world better in some way. It simply means more things" (Seger 2011).

- 3. Materialism as the Goal of Success as described by Richins and Dawson (1992) in their construct and measurement of materialism (as cited in Green, Griffith, Aruguete, Edman & McCutcheon, 2014). It is about the importance that persons attach to their material possessions and the acquisition thereof. There are three perceived dimensions of materialism. One is "centrality, by which they mean the extent to which possessions and their acquisition is a central part of a materialist's life. Another is the pursuit of happiness, meaning that acquiring possessions is vital to the happiness of a materialist. Lastly, possession-defined success, meaning that materialists judge the success of themselves and others by the quantity and quality of their possessions" (Green, et al. 2014).
- 4. Success as empowerment such as more regarding whether their work supports their family life. If they enjoy their work, and if it gives them an opportunity to spend time with their family and has a balanced life, they'd consider themselves successful. An Israeli screenwriter said that her reason to go to Hollywood was not that he does not need money but because she wants to be near her family instead (Seger 2011).
- 5. Success and Effectiveness: They can see the results, and feel fulfilled by their work, but also know their work fulfils others, either because the product they make is useful, or because the service they provide is helpful (Seger, 2011).
- 6. Success and Joy: Some define success by whether their job suits them and by how much joy they have as a result of their work. They define success by the joy they feel when they do the work; the joy they feel when they've finished the work; and by the joy that others feel as a result of their work. Or when one "makes a good difference" in society (Sinha, 2016).

- 7. Success as wellbeing, wisdom, wonder and giving (Schawbel, 2014).
- "Success is peace of mind, which is a direct result of selfsatisfaction in knowing you did your best to become the best you are capable of becoming," by Legendary basketball coach John Wooden (Brainy Quote nd).
- 9. Success as fulfilment of self-worth: "Success likes you, liking what you do, and liking how you do it." by Acclaimed author Maya Angelou (Goodreads, nd); "Success is going from failure to failure without losing enthusiasm," by British politician Winston Churchill (Goodreads, nd); "If you carefully consider what you want to be said of you in the funeral experience, you will find your definition of success" by Stephen Covey (Goodreads, nd); "The more you're actively and practically engaged, the more successful you will feel" by Billionaire Richard Brandson (Azquoutes nd). Self-worth was described by the African Americans in the concept of "somebodiness" which in a way would be one of their criteria of being fulfilled or being successful. As Johnson (2016) says in his study "Somebodiness and its meaning to African American men" that one's worth as a person is the realization that one is God's creation. One's gift of life gives one the responsibility to make the best out of it. It is this feeling of a sense of purpose for the community that one feels important giving one his/her own "somebodines." One must discover how one can be productive and be contributory to the welfare of others.
- Success is about establishing a certain status. De Button's (2012) attribute success to one's status, as when one looks upon by others. It is gained by being appreciated or loved by others because of one's meritorious work or gains a good reputation

from others. Its result will be resources, freedom, sense of being cared for, space, time, being thought valuable, and comfort. People confers status to flattery, laughter, invitations, deference and, attention. However, when one did not achieve success, he is in the condition of "status anxiety as the desire for position and recognition gone excessive, leading to the worry that one will not achieve appropriate levels of success as defined by society, which will result in a poor treatment or lack of respect. A desire for status can also be-be motivational as de Botton contends. But when we encounter "causes" for anxiety about our progress, such as lovelessness, snobbery, and other painful digs in life, we may become neurotic in our pursuit of status, leading to fear and perfectionism that hinder, rather than promote, our progress, robbing us of our joy. De Botton (2012) examines "solutions" society has proposed to address the problem of this anxiety, including philosophy, art, and religion, among others. He advocates a perspective of "memento more": remembrance of our deaths can establish an appropriate order for our priorities and free us from the tyranny of worry about what others think of our lives (De Button, 2012).

11. Success in personal and professional life. Lannon (1990) discussed the two paradigms of success namely the old dichotomy between the professional and personal life; that the success is about career development through promotions and climbing the "corporate ladder." The disadvantage of this model is that the individual is seldom satisfied or happy since the expectations of the corporate world is never ceasing as its continual upgrades make the job more demanding giving more pressure to the individual. While in the new model, there is no dichotomy but rather an integration of work and other aspects of life such as family life, community service, and leisure activities among others. In the new model, it is not only about achieving one's goal

but the satisfaction of the way one achieves his/her goal in life. Part of the success is also about the giving back of something to others. As Lannon (1990) explains, we experience the richness of giving something back. It will give one the personal satisfaction as a self-expression that one gets from it. "Giving back" gives one fulfillment and richness of life.

- 12. Success as a celebration of life. Ralph Waldo Emerson's (Goodreads, nd) view of success is about the celebration of life itself. It is also about what life gives to us as he says something about the capability to enjoy life and can laugh, winning the respect of one's fellowmen, being appreciated by other men, being able to accept criticisms and betrayal from false friends, be able to appreciate beauty and feel life whole and fulfilled.
- 13. Success understood in the religious point of view. Success may not all the time about numerical goals. In the religious sense, success is more associated to virtues of being rich in Faith- loving and worshipping God, emotional contentment, serving others and good family life (Valters, 2016).

The study aimed to identify the concept/s of success as perceived by the graduate students. Specifically, the research wanted to find out how success is associated with 1) Social Status 2) Economic Status 3) Personal Attributes; the attribute/s that influenced the development of success; their perceptions about the means of achieving success; and their reactions when they believe they have not achieved success. This study aimed further to come up with a concept of different dimensions on the perspective/s of success to understand more fully individual behaviors. These perspectives when known and understood better may help understand people's behavior both in the individual level and social behaviors level.

Methodology

The study was a descriptive research. It is a qualitative type of research under the social constructivist paradigm which emphasizes the socially constructed reality. It is about recording human behavior and experience, including contradictory beliefs, behaviors, and emotions (Alzheimer Europe, 2009). In this particular study, recording, grouping, analyzing and interpreting of the human concept of success was done from the results of the individual interview and in the collation of responses from the questionnaires.

The study used the phenomenological approach. I interviewed the respondents with the use of an interview guide, and for the others, I used a prepared questionnaire for the response to use. At first, the researcher did an individual interview with ten graduate students who are members of the faculty and staff of the university using the guide questions. I did not choose the focus group discussion as the responses of one member of a group may influence the responses from the perceptions of others in the group. The responses from the individual interview were written down and then electronically recorded and later transcribed as needed. The responses were grouped into main themes for the interpretation and discussion of the findings, deriving significant philosophical insights turned to conclusions and generalizations.

I conducted the study among the different graduate school students of the different programs of the University of Baguio, General Luna Road, Baguio City. The total population of the graduate school for Second Semester A.Y. 2016-2017 was 246, and the actual respondents for the individual interview and the questionnaire were 88 which is 36.00% of the total population. Nine (9) of the respondents were interviewed using the prepared interview guide while the rest (79) answered the questionnaire distributed to them for them to answer. The graduate student respondents were representatives from the different

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graduate courses namely: Doctor of Philosophy in Education, Doctor of Philosophy in Criminology, Master in Criminology, Master of Business Administration, Master of Arts in English, Master of Arts in Education, and Master of Public Administration.

The research, as it is qualitative and descriptive in approach, used individual interview guide questions and a prepared questionnaire for selected individuals. I provided a blank space in each of the questionnaires for the respondents' explanations should they wish to elaborate on their answers.

The researcher asked from the deans of the graduate school programs the approval to conduct the study through a formal letter after which I, in turn, asked the approval and assistance of the professors to distribute the questionnaires to their respective students. I read the letter to the respondents for the Master in Public Administration class regarding the nature and purpose of the study. I informed them that in no way was the questionnaire be obligatory for them to answer and that they have the right to refuse or not respond if they decide so and it will be respected. For the other classes, I distributed to their teachers during the graduate school as permission from those who were individually interviewed using the interview guide questions based on the problems. I asked questions using neutral statements, avoiding judgments, insinuations, manipulations, unwarranted suggestions and the like that may influence the responses of the respondents. As a researcher, I promised strict confidentiality of the responses as it was assured of the respondents from the interviews and questionnaires as names were omitted in the analysis and interpretation of responses (as their names were not asked even in the answering of the questionnaire and the individual interviews). The results will be disseminated through a research colloquium is scheduled by the Research and Development Center of the University of Baguio and through publication by the research and development office is to be scheduled for the dissemination of the results.

The responses from the individual guided interview were written on paper while the interviewee was answering. The researcher recorded the responses verbatim and when some responses were not clear to the researcher the interviewee was requested to clarify or repeat his or her response. The responses to both the individual interview and the questionnaires were recorded separately at first but later was put together since the responses did have similarities, if not, stated in the same way. The frequency of the responses later was tabulated /tallied and computed according to the percentage of the total frequency within each of the problems/ questions. Since the study was descriptive, the frequency of the responses was computed and presented but not emphasized to avoid a purely quantitative study which is not the main purpose of this particular research. Also, the brief written and verbal explanations of their responses were grouped according to the sub-themes within the general theme (the particular problem variables. It was then analyzed and later identifying particular worldviews or concepts that may reflect general human experiences and for some relate them to previous studies if there are available data.

Discussions

1. The Concept of Success of the Graduate School Students

1.1. The concept of success related to personal attributes.

The concept of success related to personal attributes are according to the following main themes:

Of the 136 responses on the nature/classification of success, about 88.23% of graduate students' responses attributed it to the general theme of the concept of success related to personal attributes. It found out that majority of the responses



described their concepts that are related more to personal attributes. It implies that majority of the concepts of graduate students' success is one's own decision making about what matters to them rather than the dictates of society. It is apparent that both economic reasons and attaining social status were way below personal attributes which means social pressures and economic considerations are no longer that influential to most of the graduate students.

Below discussed are the sub-themes under the main theme of the concept of success related to personal attributes.

- 1.1.1. Success in achieving one's goal in life, determination and hard work. Their comments or explanations under the theme mentioned above are according to the following sub-sub-themes:
 - 1.1.1.1 Hard work as the necessity: It is common knowledge that the graduate school course is not a walk in the park activity. It demands time for self-learning, research activities and attendance to classes during the evenings of weekdays and weekends. The notion of success portrayed by this particular theme is that its attainment is not easy, but rather it is a challenging endeavor. Every idea of success brings forth trials which is in Filipino as "mga pagsubok" which means trials. Because of this notion, one must be determined and has the will to persist. This particular notion of success also implies one's being ready to face the challenges and must have a "fighting stance" which is so common among Filipino sayings such as "ipaglaban mo" (fight for it) or "pagiging matatag" (being steadfast). It is is also in a way related to the Filipino value

of "*Bahala Na*." According to Jocano, as cited by Feliciano, in her book about Filipino values and our Christian faith, no longer interpret it in the negative way equivalent to fatalism or resignation but rather in the positive way as an active motivation to do one's best through hard work and determination to achieve success. "*Bahala na*" according to Jocano now means raw and simple courage — a deliberate and willful burst of energy for effecting changes (Feliciano, 1990 p.16-17)

- 1.1.1.2 As the fruit of one's effort: that their persistence and passions will lead to one's satisfaction of what one achieves. The fruit of this endeavor is now one's title as having a graduate degree either at the masters or doctorate level, giving the individual better qualifications for possible promotion and recognition. This particular subtheme emphasizes that success is an aftermath of the conglomeration of intended activities in achieving a particular goal. In the words of Deepika Padukone, the fruit of your hard work is the sweetest (Azquotes, nd). It is opposite to the notion of success as simply given or gifted with it or coming by pure chance or destiny. This notion, therefore, contradicts the Eastern view of success as something that emanates from the natural course of events (Kakabadse, Nortier, & Abramovici, 1998).
- 1.1.1.3 As a gratification or inspiration: The particular view of success as gratification or inspiration

and that of overcoming challenges reflects some of the Western views as manifested in the following statements: The concept of success in this particular theme is emphasizing the rewards or the gratifying experience that goes with its accomplishment. This exhilarating experience becomes one's inspiration or motivation to pursue one's goals through one's effort. The rewards are sweet for those who strive to achieve their goal which is expressed in the Filipino saying "Kung walang tiyaga, walang nilaga" (If there is no persistence, there will be no food on the table.) One of the strengths of the Filipino character (mentioned in the study for a Moral Recovery Program proposed by the senate in 1992 as lifted by Balatbat (2014)) was "Hard Work and Industry." This practice is where Filipinos do their best to work hard in the end view of changing their economic conditions for the better, making it an incentive to work harder (Balatbat, 2014).

1.1.1.4 As a triumph, achieved through one's overcoming of challenges: This concept is common among Filipinos where the concept of overcoming trials is a common script in Filipino TV soap operas. Success as a form of a triumph is psychologically effective when it comes to viewing it since it gives one a special feeling of pride which boosts the morale or self-concept and self-image of any individual.

The sub-theme earlier mentioned is also confirmed by a related study which recognizes hope as a motivation for goal striving or in attaining success (Nelissen, 2017). One study also attributes grit, defined as perseverance and passion for long-term goals that contribute to achieving success. (Duckworth, Peterson, Matthews, & Kelly, 2007). Persistence while undergoing problem-solving activities is practiced more among students who are mastery-oriented rather than those who were performance- oriented, a motivated and performance-avoidance oriented (Sideridis & Kaplan, 2011). Another study recognizes the role of momentum that will significantly augment future success and facilitate goal achievement (Iso-Ahola, Dotson, Gula, & Briki, 2016) while values, goal orientations; interests serve as a motivation in doing achievement activities (Weigfield and Cambria 2010); Self-regulation, i.e., people must persevere on tasks that they deem important, regardless of whether those tasks are enjoyable to achieve success (Critcher & Ferguson, 2016).

The responses for this particular cluster would show a concept of success characterized as those persons who attribute success as life according to a mission. It is the one activity that makes their life meaningful. The person has the sole responsibility to give meaning to his/ her life according to the task at hand. It is through this endeavor that a person gains

fulfillment. Success in this cluster is strongly related to being goal oriented in life as well as its direct relationship with its achievement (of any endeavor) rather than a particular condition or state of being. This particular trait confirms one of the Western traits about success among the athletes where they believed that success or failure is directly related to the achievement or failure in achieving one's goals (Podlog, 2002). This particular worldview of success for the students has advantages and disadvantages when it comes to managing one's personal life. To be focused is an advantage that leads to a certain goal. However, there is also a downside to this particular concept especially when not at all the time are instances do man has control of instances. In other words, a man may have his greatest gratification in his hard-won achievement, however, when not attained, it is also directly proportional to its negative impact the moment it is unattained

- 1.1.2 Success as the capacity to enjoy, celebrate or to feel good or be happy. This characteristic can be seen further as explained by their comments in which all belong to a similar theme that is:
 - 1.1.2.1 Success as a state of being a disposition: Those respondents in this theme believe that success is what makes a person happy. This particular cluster of responses perceive success more in either the psychological aspect wherein success may not necessarily be about achieving a given task or performing a mission but rather

achieving a particular condition where one can have the capacity to enjoy life itself to its fullest in any given moment and given circumstance. As articulated by a young Puerto Rican woman in one study about success as follows: "Success is ultimate happiness...not necessarily having a six-figure Job or owning a Bentley, but I think... having a house, having a family, being able to keep a stable Job but without being stressedout. That's success. Because sometimes when you have the six-figure Job and all these bills to pay you are always going to be stressedout". (Llorens, & Quijano-Garcia 2012 p. 91). Success in this particular parameter does not focus on a task but rather on one's disposition towards any situation or activity provided one can find happiness or enjoyment. This particular outlook may either find life easy to live with depending on one's capability to be contented and happy in any endeavor or situation fully depending on one's disposition. However, it is most difficult for those who find difficulty in becoming contented and happy.

1.1.2.2 Success as Happiness: There is a close relationship between contentment and happiness; the former, as a fulfilling relationship with the self and society (as a disposition) while the latter is related to pleasurable experiences. Achieving success for some respondents will be achieving contentment and happiness (McKenzi, 2016) and having money as a goal does not necessarily lead to or related to subjective well-being which may translate to contentment or happiness (Gardarsdottir, Bdittmar, & Aspinal, 2009).

Moreover, putting together the last two themes of success namely: the capacity to enjoy or be happy and as a non-material state of well-being add up to about more than 30% of the responses. It shows that although success is related to the attainment of one's goals, a significant number of percentage of responses would associate these goals leading to a fulfillment that is non-material. The state of well-being goes beyond the psychological feeling of "goodness" or "wellness," it is more of the feeling of completeness or fulfillment in the non-material sense. It is the fruition of an objective or goal beyond the physical, a realization of a certain state of being, of wellbeing. Philosophically speaking, this particular theme of success is more described as the fullness in the process becoming, the full revelation of the truth. The challenge to this particular state of being is its achievability s the description is more of a terminal goal in everyone's life, the goal that is most likely be at the end or even in the afterlife.

- 1.1.3 Success as attributed to a personal internal, non-material state of being, contentment or wellness or wellbeing. The following are related statements grouped into the following sub-themes:
 - 1.1.3.1 Success as feeling a sense of satisfaction through one's service to others: There are graduate

school students who may associate fulfillment in life by way of being of service to others or contributing to the welfare of others. Success, in this case, reflects the value of altruism where one feels fulfilled not in one's achievement per se but rather on one's contribution to the betterment of the lives of others. This particular value of the Filipino value of being serviceto others-oriented or "*pagkamatulungin*." (Andres, 1998).

Contentment felt for achieving one's goal/ 1.1.3.2 dream: Those graduate students who considered success as the fulfillment of a goal or dream are aspiration driven. It assumes that every individual life must have some ambition or a goal to achieve and that this necessitates a psychological will to be able to attain it. Goal attainment through one's will and effort gives the feeling of satisfaction when achieving them. This projection or visualization of a goal in common language is "one's fulfillment of a dream." An example of this is in the form of an academic degree such as in a Master / doctorate: Academic Honours received, a "dream" house, family or career. The term in Filipino is "Pagtutupad ng pangarap sa *buhay*" (Fulfillment of one's ambition in life) which one can say that he is "Matagumpay sa buhay" (one is successful - achievement of something in life). A study about career success and satisfaction, a comparison of nine countries found out results showing no differences in

satisfaction based on occupation or country and most demographic variables investigated did not have a significant relationship with satisfaction (Punnett, Jo, Fox, Gregory, Lituchy, Miller, Monserrat, Neusa, & Santos, 2007).

- 1.1.3.3 Contentment as self-actualization: This particular sub-theme signifies that more profound character of success that is more of a qualitative description of success (opposite of materialistic goals). This particular sub-theme is also related to one's arrival at a particular disposition such that one already is not seeking for anything anymore but pure contentment, inner-peace or just achieving wellbeing which is the highest need of a human person which in Maslow's hierarchy of needs is called "self-actualization." (MacLeod, 2016).
- 1.1.4 Success as attributed to the capacity of doing something, having more freedom or having empowerment. Under this theme are the following sub-themes:
 - 1.1.4.1 Success as being educated. This particular cluster of the concept of success is also associated more with the enabling capabilities of the human person. It is when the measure of success is the degree of capability of a person to do what he wants to do what he thinks or believes he has to do. This particular condition shows the person can freely decide on his actions given a situation and sees no or minimal hindrances such as physical, psychological, economic social and the like. The challenge to this concept is that

the capability to still be fulfilled and happy despite one's limitations and imperfections is out of the picture. Undeniably, those who have good education have more job opportunities in society. Those who have jobs have the income. Consequently, those with high income have more capacity to fulfill their needs and have added material needs and luxuries. In turn, they can do more things since they have the means. It is for this reason they believe they are more empowered.

- Success as providing a good self-image or self-1.1.4.2 concept. Success directly or indirectly boosts one's self-image as it gives one the confidence to face the members of the community as it is even a source of pride to flaunt to others. Conversely, when one has a low self-image and low selfesteem brought about by being unsuccessful, losses one's self-worth. Hence he feels shame ("nahihiya") or faceless/incognito in the midst of the community or worse when the individual intentionally avoids socialization as she has no face to show to other people ("walang mukhang maipapakita"). Although high self-esteem does not guarantee success in work, occupational success may boost self-esteem (Baumeister, Campbell, Krueger, & Vohs, 2003).
- 1.2. The concept of success related to social status. Six-point sixtytwo (6.62%) of the responses relates success to a certain status in life or society itself. It shows that attaining a certain social status in life is among the least in the concept of success among
the respondents. All these statements mentioned under this theme reveal that a few respondents still consider success as a status symbol or one's ticket to social acceptance. There are many ways society acknowledges status such as exclusivity of associations limited to the well to do or elite members of society, the professionals and public officials, the famous or popular members of society. Achieving success gives an individual a privileged position in society. Furthermore, this condition will give more chances to an individual to be recognized, gain prestige and gains a sort of status symbol through social titles, recognition, awards, and publicities in all forms of media given by members of the same group in society. This particular concept was rather weak earlier on before the influence of Western education. However, among the graduate school students, Western education now had a significant influence in how they would attribute success to one's high social status. Hennig explained in his outline on Analytical Framework for Understanding Philippine Values showed that the Asian ethic of ascription manifested as "Amor propio" (pride) was now influenced by the Western ethic of achievement whose Western manifestation is upward or downward mobility. One's achievement in his job gains social status (Hennig, 1983). Although success traditionally determines one's social status in certain societies, the case of the emerging elite in the Balkan states would prove that the very definition of success is rapidly changing over time as age is now a determining factor. (Nugin & Onken, 2010).

1.3 The concept of success related to economic status. This particular theme was also one of the least in the student's consideration when it comes to achieving success which is 5.15% of the responses. Majority of the responses on material wealth were not directly attributed to affluence nor living a luxurious life but more related to adequacy that may lessen if not removes the threats of financial

instability. In this sense, achieving success may be a positive endeavor. However, excess to the acquisition of material goods and luxuries may make success not a way to become financially secure but instead the opposite whereby the individual can no longer be satisfied with whatever on possess as human desires are most of the time insatiable. There is a similar result in the study of values among the young Filipino adolescents, which revealed that the adolescents gave higher rankings for hedonism and stimulation and lower ranking for achievement. The adolescent respondents have similar rankings among the strata of respondents (upper, middle and lower) (Bernardo, Clemente, & Liem, 2014). If the trend does not change, it implies that in the years to come there would be an increase in the percentage to responses of the concept of success related to the responses above mentioned. The notion of one's success influences one's achievement of goals. A similar study among Puerto Rican Girls in the lower income bracket revealed that success is multi-dimensional- among them happiness, well-being, life satisfaction, economic independence, stability, and fulfilling social relationships. (Llorens & Quijano -Garcia, 2012). Similar if not the same dimensions were present among the responses of the graduate students.

The general findings as to where the respondents are leaning towards regarding nature or classification are varied to include themes such as achieving a certain goal through one's effort and hard work and the more non-material achievement of wellbeing and contentment. Acquiring of material possessions and gaining social status is the least consideration in setting goals for success. It indicates that success as man's goal may not primarily be about material wealth of neither power nor social acceptance. A human person's fulfillment cannot be achieved without material fulfillment however it can only be instrumental to other fulfillment which is beyond the material such as contentment, peace and happiness and other personal attributes. Hennig (1983) cited Lynch's (1964) "The Ultimate Filipino Values" for a good life on earth as follows: 1. social acceptance- for what one is, what he thinks of himself to be or would like to be. 2. Economic security and 3. Social mobility (Hennig, 1983). Social mobility as mentioned above is still observable among the graduate school students' responses relating success to social acceptability, status, and economic status.

2. The Criteria of Attribute/s that influenced the Development of the Respondent's Concept of Success

In the distribution of the percentage, it says that how the concept of success developed was due to different aspects of influence acquired by the graduate school students. It was diversified and fairly distributed among the different aspects such as society, the family, the school or ones decision making. It means that influence as to the concept of success experienced by individuals varies from person to person. The influence may be from a single source or varied sources at the same time

- 2.1. The concept of success as influenced by the family. The family was first in rank in the aspects that influenced the individual's notion or concept of success. This aspect was 36.43% of the total responses. Some of the respondents' explanations about the influence of the family are grouped in terms of the following sub- themes a follows:
 - 2.1.1 As inspiration or motivator. This shows that the family does its responsibility to be instrumental or supportive to the aspirations of the family members. A related study has shown that mastery and performance-approach

goals were both positively associated with academic achievement, personal performance standards, and parent-oriented achievement motivation. This implies particularly that in terms of academic achievement, parent achievement motivation is a factor. In a way it could be said that family motivation is a variable in the success of students performance and more so their achievement. (Bernardo, 2008).

- 2.1.2 As a challenge: Success may not be easy to achieve hence some graduate students may have termed it as a challenge especially when pressure is given to individuals by the members of the family or the community.
- 2.1.3 As an instrument to make the family happy. One's responsibilities may not only be for one's self but also related to the expectations and roles the family has set. The graduate school respondents, with their level of education, also reflects the Filipino value of "*utang-naloob*" (debt of gratitude) in the positive sense of giving back what the parents are sacrificing for their children. Being successful therefore will most likely make the family, particularly the parents, happy with the child/ children's success. As success will guarantee support for their parents in whom Filipinos are not yet open to endorse their parents to institutions such as the home for the aged. (Reyes, 2015)

The Filipino family, as described in Banfield's book, are very close knit. Parents are a strong influence to their children and siblings who are even willing to sacrifice for each other. Hence, success for the Graduate school students was apparently influenced by this particular Filipino trait mentioned above. However, it

could also be said that the very close knit family may be a hindrance to the larger society such as the nation such as seen among political clans (Tan, 1997). Close family ties was also identified as one of the strengths of the Filipino character explained as follows: "To the Filipino, one's family is the source of personal identity, the source of emotional and material support and one's main commitment and responsibility (Licuanan, 1992). This is also found in the study among the populations in the United States and India where in it was found out that "Family influence was correlated in expected ways with family obligation, work volition, work values, calling, and occupational engagement." (Fouad, Kim, Ghosh, Chang, & Figueiredo, 2016). In the Philippine setting it was confirmed that parents, both Filipino fathers and Filipino mothers, though in different degrees, foster traditional values of adhering to parental authority and child obedience. This fact now assumes that even in the area of family values the concept of success may be formed, developed and strengthened by this family relationship (Alampay & Jocson, 2011). A similar study also mentioned about young Australian students attribute academic success not only to hard-work but also having a supportive family which is believed to be of help despite studies showing a negative association between family support with performance (Smith, & Skrbiš, 2017).

2.2 The concept of success formulated or developed as influenced by education. Educational attainment in one's achievement of success rather than the process itself of education that moulded their concept of success is an important concept manifested by the respondents. This accounted for 28.68% of the total responses which ranked second after criteria the influence of the family. The following were comments regarding the influence of education grouped according to the following sub-themes:

- 2.2.1 Education as a stepping stone to one's career development: Success in this particular context is understood as the fulfilling or accomplishing of one's career one step at a time. It plays a big part especially on specific qualifications. The particular notion of educations that leads one to success as influenced by neo-liberalism is very strong in Western counties nowadays where educational policies of governments are market driven. (McGregor, 2009).
- 2.2.2 Education as knowledge building is the key to one's success. The power of knowledge gained in education is emphasized in this cluster. This implies that ultimately knowledge is power. One's intellectual capability is indispensible in crucial decision making in the most significant actions one has to do. It is instrumental in attaining one's goals in life leading one to success. A similar study explored the interplay between educational achievement, occupational success and wellbeing and found out that indeed there was a connection. (Samuel, Bergman, & Hupka-Brunner, 2013). As in the case in high-school, education plays an important role in the selection of which concept of success may be adopted through values-clarification activities in class
- 2.3 The concept of success formulated or developed as influenced by one's free choice. The concept of success which was formulated by one's free choice or decision came third in the ranking with 13.95% of the responses. This is reflected in the responses grouped into the following sub-themes as follows:

- 2.3.1 Success as an offshoot of one's free choice defines one's selfhood: This particular sub-theme by some of the graduate students would manifest the character of success being decided upon or chosen by the individual person. This act would emphasize the empowerment of the individual to determine for him his own concept of success which he thinks is acceptable. The whole meaning of success is a way is dependent on the ownership to whatever decision making one makes of his actions. What good a seemingly successful condition if it were not freely chosen by the individual. There will no longer be personal fulfillment in case the decisions were left to people other than the concerned individual. And by this particular act of self-selection would affirm his autonomy, boosts his self-esteem, and more so, his very choosing of what he wants for his life, determines his actions which later reveal his own unique identity. This seemingly shifts of the traditional Asian virtues of humility, harmony, and modesty are now slowly being replaced by the stress on the individual worth giving the individual the needed self-confidence and assertiveness which was stressed in the Western tradition of education (Hennig, R. 1983).
- 2.3.2 Free choice endows one with responsibility: T h e respondents' awareness to practice autonomy when it comes to achieving success does not only provide a sense of ownership to one's decisions. It also gives these particular` if it is not achieved it is all attributed to one's own neglect or failure. To whatever decision one will make out of achieving their own desired success criteria, it is the very freedom to choose which course of action will make one do meaningful and desirable

actions.

2.4 The concept of success formulated or developed as influenced by one's belief or religion. Success as provided by God or the Almighty: To some respondents, the concept of success has been influenced by their beliefs or religion, a few respondents, 3.87% views success as something that is God's will. The religious concept of success as manifested by the responses clearly defines it as God's gift which an individual must abide or accept and never impose. This particular notion is akin to the notion of the Eastern thought wherein success is not necessarily attained through one's decision or effort but more acceding to God's or the Supreme being's will. Another study would show that having positive concept of oneself as when they can experience themselves as persons of worth and value. Believing that they were created by God and that allows them to define themselves as human beings of worth, regardless of other's opinion. (Johnson, 2016). Same number of respondents at 3.87% were not definite or not sure about what influenced their conceptualization of success itself. Others mentioned that it must be a combination of the aspects mentioned previously.

With the findings above on how the concept of success was developed it shows that though there was one very strong single influence which is the family, there were other aspects that did influence such as with the combination of different aspects such as education, personal choice, community and one's religion and the others.

2.5 The concept of success formulated or developed as influenced by the community or society as a whole. The community or society had a great influence on one's concept of success. This was shown by the responses with 13.12% which was fourth in rank but close to the third in rank which is one's free choice. This was how the respondents stated according to sub-themes namely:2.5.1 Society as a strong influence in providing the parameters in achieving success. The following are the statements:

Society manifests its great influence in the notion of success to individuals by way of social acceptance shown through social recognition, prestige, commercialism and societal preferences. A graduate school student's aim therefore is to finish his studies in the graduate level that gives him a status higher than an undergraduate degree holder. His graduate degree is more qualified to hold some key positions in the private and public offices since most of the qualifications for as supervisory job in both sectors requires this particular qualification. And having a graduate degree course will also gain him the needed respect brought about by his academic degree background. This is one criteria of success that is strong among individuals who are career oriented. This was corroborated in the survey of Nielsen about the education aspirations of the world (2013) which says that Filipinos, in general, believe more strongly in the correlation between education and having better employment prospects and that Filipinos believe that the quality of one's education directly correlates with opportunities in the workplace (Lucas, 2013).

2.5.2 Society provides a notion of success related to one's contribution to it or success as having as a sense of mission.

The following are the statements: "they give encouragement"; "they influence me- helping achieve

my goal"; "Influence of the community...if they (community) are happy or not to what I have done"; "I have to share what I have learned in the community"; "nowadays we compare people based on their success".

For other graduate students, they see success as related to one's contribution to their fellowmen through their social roles defined by society. In this cluster, success is seen as not only as personal development but rather it also considers one's contribution to society's welfare. Ones' work is associated to one's calling or "vocation" (from the Latin word vocare which means "to call"). It assumes that work or labour is one's contribution to society. And when he identifies his role in society by choosing a particular profession and successfully playing his role he now believes he had done his job. In doing his role, other people now believe that he contributed to the welfare of the community as others will say of him "he is true to his calling". This is also shown in the expectations of the community relating to how it plays a significant role in one's concept of success as shown in the Turkish community identifying four important phenomena namely: general self-efficacy and control, self-reconciliation and a life free of problems (Aypay, 2016).

3 The Perceptions of the Respondents about the Means of Achieving Success

While the concept of success varied among the respondents, so too are the means in achieving are likewise of different ways. The ways can be described as either how or the manner it is achieved and the other in what particular time or occasion can one achieve them either

immediate or terminal in nature. The following discussions will be about the first group which is the manner in which success is achieved is compared while it will then be followed by the discussions about the time or occasion in which it can be achieved. This means that if success can be achieved immediately or that if it is terminal or at the end of one's endeavor in life. The first two main themes (3.1 and 3.2) contrast such that the basis of achieving success is one's volition and decision to achieve such or that one perceives success as a natural phenomenon where it happens even without one's liking or intention to achieve such. Comparing the percentage of both themes, more respondents believe success as something that one should work on rather than it is by fate or destiny with percentages of responses 43.87% and 5.16%, respectively. It implies that for the graduate school students, they look more at success as something to work on and exert effort rather than just waiting for it to come if indeed it will come. In other words, for the latter, one cannot directly will success to happen. Chance or divine intervention may have some influence over its attainment. The last two themes 3.3 and 3.4 of the main themes as a. achieving success as an ultimate goal at the end of one's life endeavor versus b. Success being possibly achieved in many ways in every step or stage of the whole endeavor with 46.45% and 4.52% of the responses, respectively. Looking at the frequencies of both themes it showed that more respondents believed in the latter, that is, on the immediate experience of success based on immediate goals rather than the long-term goals achieved at the end of one's life. It is related to the Construal level theory, formulated by Nira Liberman and Yaacov Trope (2010) as cited by Tumonis (2015) which explains that mental representations not related to the here and now are construals. The more distant it is (high-level construals), the more general and abstract concepts are. Hence, in achieving success through people can look at the remote end, they appreciate better the closest to the here and now which one can experience direct or immediate gratification compared to the remote mental representations of the events of the future or remote end (Tumonis, 2015).

- 3.1 Success as achieved through one's effort or determination. Fortythree point eighty-seven percent (43.87%) of the responses attribute the nature of achieving success through effort and determination. It shows that most of the respondents believe that success does not come by way of luck, destiny or just handed over on a silver platter to anyone who would like to have it. It was evident in the respondents' statements as according to the following sub-themes:
 - Effort and determination guarantees success: This 3.1.1 theme assumes that the road to success is not smooth but rather assuming it to be full of trials and challenges that include a strong willpower to persevere. The concept of success may have been partly attributed to the American Influence as mentioned by a self-made American man who shared his take on achieving his version of "The American Dream" where he recognized the significance of hard work, sacrifice, and risk-taking (Willams, 1997). Another is a failure is the result of lack of effort over a period (Mayberry, nd). A similar experience mentions that among the young Australians believes either academic success or academic failure is brought about by the amount of hard work exerted and talent rather than relying on luck, and other factors (Smith & Skrbiš, 2017).
 - 3.1.2 Initiative-Self-initiated effort to achieve success: The concept of success above discussed relating it to self-initiated activity emphasized ones pre-disposition in truly and willingly exerting effort to act according to in reaching one's goals. It is also emphasized in the common story of "Lazy John"(*Juan Tamad*) wherein John just waits for the guava fruit to fall from the tree and drops to his mouth.



- 3.2 Success is attributed to the natural course of events or attributed to destiny. Ten point five percent (10.5%) of the respondents do believe that success is a matter of destiny. Most of those who attribute success to destiny implies destiny in the religious sense to mean "The will of God" or "about God's plan". Another is also related to the age-old Filipino saying "Kung hindi uukol, hindi bubukol" (If it is not meant to be...it may not happen). This value is about submissiveness to life's destiny which may be taken positively such as accepting one's limitations and doing one's best with what one has or, negatively, when it breeds passivity or idleness that leads one to a fatalistic view of life (Tadhana Oriented- Fate/ Destiny Oriented). A person's belief in God allows him to define himself as a human being in the sense that it is God who gives sense to his life and not what others would think of him. (Johnson, 2016). It implies the meaning of faith itself as leaving it all to God.
- 3.3 Success is achieved in different stages in one's life. Forty-six point forty-five (46.45%) of the respondents perceive success can be achieved in different stages in life or at different instances (titbits of success) not necessarily only attained at the end of one's journey in life. The general theme can still be divided to sub-themes as follows:
 - 3.3.1 Success as attaining or reaching a particular step in the succession of steps or stages throughout one's life. In each of the small or big steps in the journey towards life's goals is already an independent success and can be a stand-alone goal yet leading to a further goal. It relates to the popular saying of Confucius which says that "A journey of a thousand miles begins with a single step."
 - 3.3.2 Success as attaining a certain psychological condition of contentment at any stage of life. Those graduate

students who gave statements in this particular subtheme do not only emphasized that bite- sizes of goals (small steps/ stages towards the attainment of goals) but more so having these achievements that entitle them to be content, satisfied or happy.

- 3.3 Success as having different faces/dimensions. The different perspectives of how success shows the divergent degree of feelings, quality of satisfaction, type of satisfaction, type of values and the manner of satisfaction among other considerations.
- 3.4 Success is achieved as an ultimate goal at the end of one's life. Four point fifty-two percent (4.52 %) of the respondents perceived success as an ultimate goal and is achieved at the end of one's life. In perspective of a Christian, what is important is where his goal extends beyond his life on earth as he will go back to God (with his soul and body) in heaven. Similarly, this particular last end for the Buddhist is the attainment of perfect peace (Nirvana) or the for the Hindus, Moksha- the liberation from reincarnation, self-realization, and unity with God both of which happen more in the latter part of life (Singh, 2016).

4. The Respondents' Reaction When One Believes Success Was Not Attained or Achieved

The distribution of percentages regarding the respondent's feeling when success as unattained is fairly distributed which implies that there are indeed many ways on how the respondents reacted although initially all of them are negative. These responses were naturally negative at first, but later they cope with the failure by making the best out of the situation and treat the experience as a challenge to perform better the next time around.

- 4.1 Tolerant and accepting. Thirty-nine point eighty-one percent (39.81%) of the respondents said they were tolerant and accepted whenever they believed did not achieve success in life. The following are some reasons to be tolerant grouped into sub-themes:
 - 4.1.1 Leaving it to God's Will. It is also reflected again in one of the strengths of the Filipino character particularly on Faith and Religiosity" identified in the study submitted by the group of Patricia Licuanan to the Senate for the Moral Recovery Program (Balatbat, 2014). Some religious reactions would flaunt the statement "maybe God has a different plan for you". On the other hand, the negative aspect of this notion is when all failures may be attributed to God although the culprit is one's lack of effort to strive or do the best to attain success. It reveals the weakness of the Filipino character which is "Passivity and Lack of initiative" which one has more reliance on others to include God (Balatbat, 2014). In this case, the religious notion above is an excuse.
 - 4.1.2 Accepting of reality. This approach shows the realistic side of the respondents. Though they felt hurt about it still it does not deter them from coping with it. Becker-Phelps (2013) suggested in her article "Accept Your Pain; It Will Hurt Less", that it would be wiser to accept one's authentic self by simply accepting one's pain and developing one's self-compassion.
 - 4.1.3 Having a positive outlook despite the failure. Social acceptance is related to people who are motivated with a positive disposition. Although failure may temporarily let a person's self-esteem down or lost, there is always the tendency to protect or regain it. (Bongers,

Dijksterhuis, & Spears, 2009).

4.2 The other reactions when success is unattained are negative feelings such as: discouragement, sadness, frustration, disappointment, hurt among others. Though the initial relations were negative, most of the responses also included acceptance of the situation and be forgiving to one-self.

Conclusions

The respondents have a fairly balanced concept of success about its nature, that is, between a life-project goal-oriented concept of success where it means achievement through hard work and determination and the more psychological end of achieving wellbeing and contentment as well as having freedom and empowerment. The different concepts/ perceptions as to the nature of success would have a bearing on their choices of individual goals, courses of actions as well as a disposition towards life itself. Although admittedly, the respondents manifested a strong trait of a Filipino which is very family oriented. The determination of success, therefore, is no longer solely family influenced but rather a combination of other factors such as the wider environment and the more empowered self. The way success is achieved mainly manifests the influence of the Western view which is a success as something that one strives to attain it rather the Eastern view wherein it may come as a natural course of an event with minimal or no intention whatsoever of achieving it. Success is an endeavor achievable in the here and now and any level or phase in one's life reflects the more realistic and pragmatic outlook on one's life. The type of success manifested was more on the immediate, multi-level, multi-faceted, series of small success rather than it is absolute and terminal. This particular view would look at life as full of bits of more immediate achievable life objectives rather than looking at it in a summative or conclusive perspective attained at the end of one's life the way religions or ideologies usually perceive them. Failure may

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bring about negative, undesirable feelings but are perceived to be only a temporary condition. A well-balanced outlook as to the nature of success will be helpful for an individual. Re-aligning one's concept of success from the too materialistic or career goal-oriented approach to the more non-material life- celebrating goals will make one achieve success more akin to the condition of happiness and contentment. Success as happiness is a non-material condition or state of being. One must achieve it as a personal life's choice taking into consideration not only oneself but also other people and the environment as well.

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Feedback and control systems laboratory training manual

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Abstract

Due to the absence of a laboratory manual, students of Bachelor of Science in Computer Engineering (BSCpE) and Bachelor of Science in Electronics Engineering (BSECE) enrolled in Feedback and Control Systems Laboratory (ECECNL1) are limited to developing microcontroller projects using a standard line following mobile robot. This motivated the researchers to design and create a demonstrative laboratory training manual in ECECNL1 to enhance the students experience and investigation of systems that will result in innovative designs and applications. The study evaluated the functionality and relevance of the proposed laboratory training manual as perceived by the students and faculty. Analysis-Design-Develop-Implement-Evaluate (ADDIE) instructional design and descriptive-evaluated research method aided by an evaluation questionnaire were employed for the development of the laboratory training manual.

An open source software was chosen for the laboratory training manual while the hardware used were selected based on availability in local electronic stores. The developed laboratory training manual resulted in the template of experiments which included the expected learning outcomes, exploration activities, familiarization of hardware and software, real-life application exercise, troubleshooting guide, and guide questions. The selection of laboratory experiments combined the course specifications of BSECE and BSCpE for ECECNL1. The result of evaluation of the laboratory training manual yielded very high functionality and very high relevance. The developed laboratory training manual is recommended to be utilized in ECECNL1 with the integration of a project presentation as the culminating part of the course.

KEYWORDS: FEEDBACK AND CONTROL SYSTEMS, TRAINING MANUAL, LABORATORY, MICROCONTROLLER

Background of the study

avies (2008) emphasized on constructivism recognizing a student is not a blank canvas. As such, design of laboratory learning needs to bring in and build students' prior learning through experiential learning, enquiry based and problembased learning. Experiential learning is a process of learning through experience and is used for professional development and lifelong learning. Experiential learning allows the student to do things while in the laboratory. The design of laboratory learning needs to enable students achieve the desired goals must go through the stages of Kolb's learning cycle as shown in Figure 1. The instructional design needs reflection to actively encourage students on their practice- based experience in the design of systems. Enquiry-based learning is a process of enquiry owned by the student where students investigate topics and encourage autonomous learning and creativity.



Figure 1. Kolb's Learning Cycle (Davies, 2008)

Laboratories play an important role to enable learners in engineering to develop necessary knowledge and skills (Campbell, Bourne, Mosterman, Brodersen, 2002). The significant roles of laboratories include a) an opportunity for the student to be an experimenter, b) polishes learning of new and develop subject matter, and c) helping the student to gain insight and understand the real world. Laboratory experiences convey innovative approaches to design, modifications in experimental set-up, and variation of experimental process. Student-centered learning strategies in the laboratory increases awareness by the students and teachers to engage in life-long learning and skill development (Chen, Zhou, Sun, Wu, Lu, and Tian, 2015). Laboratory practices provide students the learning environment to develop skills through performance or action. There is a distinct need to bring in innovations in laboratory activities for nurturing and developing competent engineering graduates with the required technical skills (Matthew and Earnest, 2004).

The Commission on Higher Education (CHED) is committed to developing competency-based learning standards that comply with existing international standards when applicable (e.g., outcomes-based

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education for fields like engineering education) to achieve quality and enable a more effective integration of the intellectual discipline, ethos, and values associated with liberal education (CHED Handbook on Typology, OBE, and Institutional Sustainability Assessment, 2014). In this regard, the recognition of the Philippine Technological Council (PTC) by CHED in representing the engineering profession in accordance to the Washington Accord stressed the importance of program outcomes that specifies the expectations students should know and be able to do by the time of graduation in relation to skills, knowledge, and behaviors that the students should acquire as they go through the program (PTC-TWG, 2014). One of the program outcomes emphasized by the PTC stressed that graduates of the program should be able to design and conduct experiments, as well as to analyze and interpret data.

Students are expected to work in the laboratory and produce the desired output with minimal supervision and guidance of a faculty or a resource material. Traditional laboratory exercises follow the stepby-step instructions in the manual in the performance of the exercises and assessed by laboratory reports (Chen et al, 2015). Javidi (2005) emphasized the incorporation of real-life hardware experience to avoid lack of hands-on skills in the laboratory pedagogy should help students' experience regardless of the environment in which the laboratory is conducted. Fiesel & Rosa (2005) stressed that the success of students learning depends on the accomplishment of the desired task.

The introduction of the MicroEd North by the Philippine Institute for Integrated Circuits (PIIC) in coordination with the Department of Science and Technology (DOST) for the wide spread training of Universities all over the Philippines lead to the development of training modules and training activities offered to electronics engineering and computer engineering educators for adoption in the curriculum. The PIIC training resulted to embedded laboratory activities aligned to the integrated circuit design as dictated by the industry and adopted by University of Baguio (UB). The integrated training directed student researches towards Integrated Circuit (IC) design and development. DOST conducts a bi-annual Regional Invention Contests and Exhibits (RICE) that calls for studies conducted by students and professionals which is actively participated by the University of Baguio.

The Bachelor of Science in Electronics Engineering and Bachelor of Science in Computer Engineering of the University of Baguio empowers students to be competitive in creating innovative designs through hands-on experience in the laboratories geared towards research presentation. DOST regional invention contest and exhibits, DOST robotics competition, and SMART Innovations and Exhibits are among the research competitions participated by students of the University.

The School of Engineering and Architecture and School of Information Technology of the University of Baguio offer project-based laboratory courses in Bachelor of Science in Electronics Engineering (BSECE), and Bachelor of Science in Computer Engineering (BSCpE). The BSECE and BSCpE students enrolled in Feedback and Control Systems laboratory are tasked to create automated control system or robotic systems using a microcontroller. Automated systems involve sensor applications for monitoring purposes and visual display notification. Robotic systems involve servomotor control for independent operation of a mobile robotic system. Arduino based microcontrollers are used in the development of automated and robotic systems. For example, Arduino is an open source microcontroller based prototyping platform which is easy to use and versatile. Arduino microcontrollers provide features for the integration of automation and communications technology. Gizduino is an open source computing platform and is based on Arduino that is ideal for students and hobbyist who are using Windows, Macintosh, or Linux. Also, Feedback Instruments "Control and Instrumentation Principles Reference Manual" provides a training manual for the purchased equipment that allows users to control a system by manually

wiring a control system using laboratory training boards. The use of the reference manual is limited to the available training board acquired at Feedback instruments. Another reference, the "Design, Fabrication, and Testing of a PLC Training Module Using Siemens S7-300 PLC" (Chua, Chan, Dy, Fernando, Tiu & Viernes, 2007), demonstrated the control of a robotic arm with various inputs and outputs to perform simple to complex operations showing the abilities of a PLC in robotic systems that is easy to comprehend. The study showed that there is much to be done to make robotics challenging but enjoyable. The "PC-Based microcontroller Programmer and Training Kit" based on PIC microprocessor for the guidance and assistance of students in microcontroller programming and interfacing of PIC training kit modules provided a complete solution for hardware and software users of PIC microcontrollers and training kits (Dimanalata, Dones, Legaspi & Paderna, 2012). Cagaoan's (2013) "Logic Circuits and Switching Theory Laboratory Training Module for Saint Louis University," with the objective of improving the syllabus and laboratory equipment leads to the development of a laboratory training module for instructors and students in Logic Circuits and Switching laboratory. Tabal (2015) emphasized that a training unit and laboratory manual based on the CHED minimum requirement is a supplementary learning material for learning microprocessor systems. Evaluation of engineering laboratory courses is a vital issue for successful introduction of advanced tool in the curriculum (Avouris, Tselios, and Tatakis, 2001) and the perspectives in question are those of practical value relevance (Rautiainen, Sippola & Matto, 2017).

No laboratory manual has been developed in UB to date to guide the students in the Feedback and Control Systems laboratory (with the course code FCNTRL1 for BSCpE, ECECNL1 for BSECE). As such students were deprived of a fruitful learning experience and limited the understanding and output project of the students to the standard line following mobile robot. The line following mobile robot has been the output project of the students since the introduction of UB to DOST microcontrollers-related competition in 2006. The present study "Laboratory Training Manual for Feedback and Control Systems" will improve the hands-on training experience of students to create systems and will serve as a guide for the development of innovative designs. The development of the Laboratory Manual for Control Systems will allow students to conduct experiments and investigate systems with open-ended activities that will result to innovative designs of robotic and automated control systems of students. Open-ended activities provide greater opportunities for authentic engagement in the process of experiments (Wilcox & Lewandowski, 2016) focused on the learning outcomes instead of the quality of inputs and process (Adamuthe & Mane, 2016). Students should be exposed to practice oriented design, conduct experiments, and be familiar with engineering instruments and equipment in engineering practice (Azaman, Rejab, & Rushawida, 2013). The study will improve the hands-on skills of the students in automation and robotic applications through microcontrollers.

The training manual aims to provide basic-to-complex training in the application of control systems to automation, robotics, and wireless technology. The training manual will aid the students to develop control systems capable of a stand-alone output operation, sensor dependent control applications, and multiple servomotor robotic control systems. The manual focused on designing functions and applications that will showcase the abilities of students in creating microcontroller projects. The developed laboratory manual involved the design of experiments in Feedback and Control Systems Laboratory. The design of experiments focused on an analog input, use of serial measurements, and digital input/ output control of a system; sensor dependent control system; automated wireless and network systems; servomotor control; and basic robotic control systems as defined by CHED course specifications as shown in Table 1 and 2.



Table 1 shows the minimum CHED requirements in Microprocessors Laboratory for Bachelor of Science in Electronics Engineering.

Table 1

Course Specifications for BSECE*

Exe	rcises	Required Equipment	Required Quantity per group	Minimum Required quantity
1.	Familiarization with Microprocessor System	Microprocessor Trainer	1 pc	5 pcs
2.	LED Matrix Character Generator	Microprocessor Trainer I/O Board I/O Board	1 pc 1 pc 1 pc	5 pcs 5 pcs 5 pcs
3.	Data Transmission and Reception through I/O Boards	Microprocessor Trainer I/O Board	1 pc 1 pc	5 pcs 5 pcs
4.	Stepper Motor	Microprocessor Trainer I/O Board Stepper Motor	1 pc 1 pc 1 pc	5 pcs 5 pcs 5 pcs

The remaining meetings should be allotted for the presentation of a project related to Microprocessor Systems, and completion of other course requirements such as practical, oral, or written examinations, where applicable.

*source: CHED Memorandum Order No. 24 series of 2008

Table 2 shows the minimum CHED requirements in Microprocessors Laboratory for Bachelor of Science in Computer Engineering.

Table 2

Course Specifications for BSCpE*

	Exercise	Required Quantity*
1.	Review of Development Platform	Depending on class size (1:1 ratio)
2.	Microprocessor System: Digital IO Interfacing: Keypad/LCD	Depending on class size (1:1 ratio)
3.	Microprocessor System: Analog IO	Depending on class size (1:1 ratio)
4.	Microcontroller System: Digital IO Interfacing: Keypad/LCD	Depending on class size (1:1 ratio)
5.	Microcontroller System: Analog IO	Depending on class size (1:1 ratio)
6.	Process Control	Depending on class size (1:1 ratio)
7.	Communication: Interfacing a microcontroller system previously developed to the PC through the RS232C interface.	Depending on class size (1:1 ratio)

*source: CHED Memorandum Order No.13 series of 2008

Evaluation of the laboratory training manual pertains to the perception of the students and faculty regarding functionality and relevance. Evaluation on functionality relates to the attainment of performance indicators for FCNTRL1 and practical use of the laboratory training manual while on relevance refers to the application to which the student or faculty can use the laboratory training manual.

The purpose of the study is to design and create a demonstrative Feedback and Control Systems laboratory training manual using the widely available Gizduino microcontroller for the subject Feedback and Controls Systems Laboratory of the BSECE and BSCpE students of the University of Baguio.



The following questions guided the study:

- 1. What is the design of the training manual for Feedback and Control Systems Laboratory?
- 2. What are the laboratory activities to be developed in the training manual?
- 3. What is the degree of functionality and relevance of the Laboratory Training Manual as evaluated by the students and faculty?

Methodology

Research Design

The descriptive-evaluative research design was used in the study. It is the appropriate method since it described the design of the training manual as well as the hardware and software requirements. The design of the laboratory training manual and laboratory activities were based on the expected learning outcomes in the performance of the laboratory activities described in the course specifications for microcontrollers of the BSECE and BSCpE program using the ADDIE instructional design. The study involved evaluation of the developed laboratory training manual regarding functionality and relevance for each laboratory experiment. The result of the evaluation served as the basis for needed modification of the laboratory experiment.

ADDIE instructional design was used for the development of laboratory activities of the training manual. The researcher developed the laboratory activity, performed, and evaluated by the students for further improvement of the laboratory activities. ADDIE instructional design (Muruganantham, 2015) was most useful for the development of the training manual for it involved a) Analysis of the current condition of the laboratory, b) Design of the needed laboratory activities, c) Development of the laboratory activities, d) Implementation of the laboratory activities, and e) Evaluation of the laboratory activities as shown in Figure 2.





The Sample

The respondents of the study were eighteen (18) BSCpE students enrolled in Feedback and Control Systems, three (3) Electronics Engineering Faculty, and one (1) Computer Engineering faculty of the University of Baguio. The study was conducted during the 1st semester of SY 2016-2017.

Survey Questionnaires

The survey questionnaire did not contain any information about the respondents for anonymity. The part of the survey questionnaire was categorized to evaluate functionality and relevance. The indicators for functionality and relevance were following the program outcomes listed by PTC. The survey questionnaire was administered to BSECE 5th year students and ECE Faculty during the 2nd semester of SY 2015-2016 to establish its reliability using Cronbach's Alpha. The functionality and relevance reliability test for the students' questionnaire both resulted in an alpha coefficient of 0.933 establishing the high reliability of the questionnaires. The functionality and relevance reliability test for the faculty questionnaire yielded an acceptable alpha coefficient of 0.75

and 0.762, respectively.

Data Collection Procedures

Questionnaires were used for the evaluation of the laboratory manual regarding functionality and relevance. The questionnaires consisted of four-point Likert scale items for the respondents to indicate their responses ranging from one (1) for strongly disagree to four (4) 1 for strongly agree. The evaluation of the laboratory manual was through a researcher made survey questionnaires distributed to BSCpE enrolled students in Feedback and Control Systems, ECE faculty, and CpE faculty members.

Statistical Treatment

Weighted mean was computed from the responses of the students and faculty for the evaluation of functionality and relevance of the training manual. The weighted mean values were interpreted as shown in Table 3.

Table 3

Interpretation of Weighted mean

Interval	Interpretation
3.51 - 4.00	Very High Functionality/Relevance
2.51 - 3.50	High Functionality/Relevance
1.51 – 2.50	Low Functionality/Relevance
1.00 - 1.50	Very Low Functionality/Relevance

Results and Discussion

Design of the Feedback and Control Systems Laboratory Training Manual using ADDIE

The design for the Feedback and Control Systems Laboratory Training manual for an outcomes-based learning instruction was based on the ADDIE (Analysis-Design-Development-Implementation-Evaluation) instructional design model to focus the learning process towards the students.

Analysis

The researchers conducted faculty consultations on a one-on-one interview for needs assessment in the Feedback and Control Systems Laboratory subject. The following concerns were identified during the faculty consultations:

- Syllabus needs to be established for the Feedback and Control Systems Laboratory subject
- Laboratory manual should be made available for students' use
- Students were limited to the pre-designed line following mobile robot as the outcome for the assessment of the course
- Students have no prior training of the Arduino Interface development environment

The absence of syllabus and laboratory manual for FCNTRL1 limited the students to out-dated resource and development of microcontroller-based applications with the rapid change of technology.

To address the faculty concerns, the consultation with the faculty resulted in the identification of student needs in the laboratory concerning the course specifications of FCNTRL1 and ECECNL1 which includes

basic microcontroller hands-on training

- input/output interfacing of microcontrollers
- implementation of microcontroller switching applications

Students' orientation and direct experience in interfacing microcontrollers will bring about innovations to current system applications.

Design

The design of the Feedback and Control Systems laboratory training manual addressed the following for the students a) learning outcomes, b) opportunity to explore the capabilities of microcontrollers, c) familiarity of the microcontroller software and hardware, d) demonstrate knowledge on the use of software and hardware and e) ability to create real-life microcontroller switching systems as described in the course specifications of FCNTRL1 and ECECNL1. The design of the laboratory manual is in support of the focus on open-ended activities stressed by Wilcox and Lewandowski (2016), learning outcomes emphasis of Adamuthe and Mane (2016), and exposure to activities and familiarity with equipment by Azaman et al. (2013).

The design of the Laboratory Training Manual was dependent on the resources that can be made available to the students and the learning outcomes that the students can demonstrate upon completion of the laboratory training activities.

Resources

The resources introduced in the laboratory training manual, equipment and materials, can be purchased from local electronic suppliers. The software used in the laboratory training manual was the Arduino IDE since it is an open source software which can be installed in Macintosh, Linux, or Windows operating system. The primary hardware used in the training manual was the Gizduino microcontroller for it contains the essential features of a microcontroller for a switching application. Interfaces to the input/output of the microcontroller made use of solid state devices for the students to create switching systems applicable to the intended application instead of plug-and-play modules such as sensors.

Learning Outcomes

Learning outcomes guided the development of the laboratory training activities for the students with basic knowledge of C-language programming, solid state electronic devices, and digital devices. The learning outcomes were based on the performance indicators for the subject Feedback and Control Systems laboratory provided by PTC for the outcomes-based curriculum and the desired achievement of the students by the faculty. The following learning outcomes were derived to address the needs of the students at the completion of the training activities at the microprocessors laboratory:

- 1. The students must be able to create a functional Arduino IDE sketch for Analog and Digital Input/Output applications
- 2. The students must be able to interface the Analog/Digital Input/ Output of a Gizduino Microcontroller
- 3. The students must be able to develop a microcontroller switching application using a Gizduino Microcontroller

Development

The output of the study was a student Laboratory training manual for Feedback and Control Systems Laboratory accompanied by a teacher's manual and syllabus.

Format for Experiments

The format of the Feedback and Control Systems laboratory training manual concerning the derived learning outcomes includes the following parts:

- Learning Outcomes
- Equipment and Materials
- Procedure
 - Arduino IDE
 - Interfacing the Gizduino Input/Output
 - Gizduino Application
 - Arduino IDE Sketch
 - Interface Circuit
- Troubleshooting Guide
- Questions which is a modified version of a traditional laboratory manual coupled with do-it-yourself applications and troubleshooting guide to aid the student to develop their understanding while working in a defined circuit.

The learning outcomes describe the expected achievement of the student after the completion of the experiment. The list of equipment and materials are the needed components and devices to accomplish the laboratory activity. The Procedure for Arduino IDE is an opportunity for the students to create, modify, and troubleshoot a functional Arduino IDE sketch. The procedure for interfacing the Gizduino Input/ Output is an opportunity for the students to simulate and observe the response of the microcontroller for an uploaded sketch. The process for Gizduino application is an opportunity for the students to incorporate both the software and hardware for the development of a switching application. The students will create an Arduino IDE sketch, interface circuit and demonstrate the operation of the microcontroller system. The troubleshooting guide is a reference for the students to show the

learning outcomes successfully. The questions verify the achievement of the student for each learning activity.

Student's Manual

The contents of the Feeback and Control Systems Laboratory Student's training manual include seven (7) activities to be completed throughout the semester based on the course specifications for FCNTRL1.

Teacher's Manual

The teachers' manual varies from the student manual since it contains explanations for the Arduino IDE sketches, notes and comments for the performance of the laboratory activities; design applications, and answers to questions.

Feedback and Control Systems Laboratory Syllabus

There was no available syllabus for the subject Feedback and Control Systems Laboratory at the beginning of the study which led to the development of a proposed syllabus for the subject. The combined CHED minimum laboratory requirements for BSECE and BSCpE courses in microprocessors laboratory served as the basis for the design of the syllabus in consideration of the training needs for student development. The microprocessors laboratory minimum requirements were used as a reference for the Feedback and Control Systems Laboratory with the infusion of PIIC training in the microprocessors laboratory. PIIC training is an industry based embedded microprocessor training for capacity building towards the global competitiveness of the students. The course specifications of CHED calls for microcontroller applications that act as the basis for the development of the Feedback and Control Systems Laboratory syllabus.



Laboratory Activities Developed in the Training Manual

The proposed syllabus content satisfies the course specifications of BSECE and BSCpE programs as shown in Appendix A with the following experiments:

- Pre-Experiment: Introduction to the Gizduino Microcontroller
- Experiment 1: Arduino IDE Familiarization
- Experiment 2: Gizduino Familiarization
- Experiment 3: Digital Input/Output
- Experiment 4: Servomotor Control
- Experiment 5: Digital I/O Interface of a Microcontroller System
- Experiment 6: Analog Input/Output
- Experiment 7: Analog I/O Interface of a Microcontroller System
- Experiment 8: Microprocessor Switching Control
- Experiment 9: Microcontroller DC Motor Control
- Experiment 10: Process Control: ServoController

Requirements for the Development of Laboratory Experiments

The design and development of the laboratory training manual for ECECNL1 was dependent on the software and hardware equipment that can be provided for the students.

Software

The software used in the laboratory training manual was the Arduino Integrated Development Environment (IDE) since it is an open source software which can be installed in Macintosh, Linux, or Windows operating systems. Arduino IDE is a free software with available online support for the inclusion of new libraries that can be embedded in the microcontroller. The Arduino IDE provides a built-in serial driver of the microcontroller for PC-microcontroller board communication such as uploading of compiled sketches to the microcontroller.

Arduino IDE has a text editor (or code area), message area, text console, and toolbars as shown in Figure 23. The text editor is where the sketch program is encoded and edited. The name of the sketch displays the name of the current sketch which is by default the date at which a new code tab is created. Sketches in Arduino IDE are saved with the file extension .ino. The message area displays status of compiling the sketch or notification for error/s during compilation of a sketch. The text console displays the size of the sketch or the possible location of error/s in the sketch. The Board/Serial port displays the current selection of microcontroller board and the serial port connection for PCmicrocontroller communication. The line number displays the current position of the cursor at the text editor. The toolbars allow compiling and uploading of a sketch to the microcontroller board, and the serial monitor. The software used for the schematic diagrams of the interface circuits needed in the laboratory training manual was the trial version of multiSim. The trial version of Multisim was used in the schematic diagrams instead of the licensed version due to the high cost of the software with a minimum of \$3205.



Figure 3. Arduino IDE Graphic Interface

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Hardware

The development of sketches requires a personal computer with the following minimum system requirements:

- Processor: >300 MHz
- RAM: >128 Mb
- Free Disk Space: >1.5 Gb
- Display Resolution: >800x600

The main hardware used in the training manual was the Gizduino microcontroller for it contains the basic features of a microcontroller for a switching application with the following specifications as shown in Figure 4:

- Gizduino ATMEGA168 or ATMEGA328
- USB Port, DC Jack, Reset, ICSP Port, Shield Connection Port
- 8V-12V external power input, 5V USB power input
- 3.3V DC power output
- 16 MHz and 12MHz on-board crystal



Figure 4. Gizduino Microcontroller

Developed Laboratory Training Manual Activities

Instead of the modular interfaces, solid-state devices were used in the laboratory training manual. This enabled the students to work on independently and be familiar with hands-on circuit design for innovative applications. The interface circuits are shown in the following figures:



Figure 4a. Schematic Design of LED interface



Figure 4b. Actual circuit on the breadboard for LED interface

The LED interface were used in experiments 2, 3, 5, 6, and 7 as output indicators in the operation of a microcontroller system.



Figure 5a. Schematic design of Switch interface

The switch interface was used in experiment 3, 4, 8, and 9.



Figure 6a. Schematic design of sensor interface



Figure 5b. Actual circuit on the breadboard for Switch Interface



Figure 6b. Actual circuit on the breadboard for Sensor Interface

The sensor interface was used in experiment number 5.



Figure 7a. Schematic design of comparator interface



Figure 7b. Actual circuit on the breadboard for Comparator Interface

The comparator interface was used in experiment number 5.



Figure 8a. Schematic design of Analog input interface (potentiometer)



Figure 8b. Actual circuit on the breadboard for Analog Input Interface (Potentiometer)



The analog input interface using a potentiometer was used in experiment number 6.



Figure 8c. Schematic design for Analog Input Interface (LDR)



Figure 8d. Actual circuit on the breadboard for Analog Input Interface (LDR)

The analog input interface using an LDR was used in experiment number 7.



Figure 9a. Schematic design for Relay interface



Figure 9b. Actual circuit on the breadboard for Relay Interface





The relay interface was used in experiment 7.



Figure 10a. Schematic Design for Seven Segment Display interface



Figure 10b. Actual circuit on the breadboard for Seven Segment Display Interface

The seven segment display interface was used in experiment 8.



Figure 11a. Schematic Design for Motor Speed Control Interface



Figure 11b. Actual circuit on the breadboard for Motor Speed Control Interface

The motor speed control interface was used in experiment number 9.

Equipment and Materials

Table 4 shows the equipment and materials used in the development of the laboratory training manual with the corresponding cost.

Table 4

Cost of Equipment and Materials

Equipment and Materials	Cost
ASUS Netbook with Windows OS	P20 000.00
Gizduino(mini) w/ATMEGA328	P735.00
16 Channel Servomotor Controller	P695.00
SG-5010 Servomotor	P398.00
Bread Board	PP350.00
Jumper Wires	P180.00
6V DC Motor	P160.00
PhotoTransistor	P95.00
8 Pin DIP Switch	P80.00
6V SPDT Relay	P65.00
IRFZ44 MOSFET	P55.00
IR LED	P40.00
Seven Segment Display	P30.00
LM324N IC	P25.00
7805 IC	P15.00
Trimmer Resistor	P25.00
LDR	P30.00
Potentiometer	P12.00
2N2222 NPN Transistor	P5.00
16V-100 microFarad	P4.00
LED	P1.50
Resistor, ¼ W	P1.00

Degree of Functionality and Relevance of the Feedback and Control Systems Laboratory Manual

Test Procedures Undertaken for Functionality and Relevance

year 20

(Implementation)

laboratory training manual was done during the first semester school year 2016-2017. The researcher personally conducted the dry run by performing the experiments with a maximum of two-hour allotment to complete each of the activities. If the activity was not completed within two hours, modifications in the procedures, instructions, and activities were made such that it can be accomplished within the intended time allotment. The modified laboratory activities were tried out during the dry run by fourth year and fifth-year BSECE students to determine if time allocations were sufficient and the learning outcomes were attained upon completion of the activity. The pre-experiment activity served as the dry run for the laboratory activities conducted by the BSCpE students. After which the same students evaluated the activities regarding functionality and relevance, and at the same time provided recommendations for the improvement of the laboratory training manual.

The dry run for the laboratory activities of the developed

The modified laboratory activities of the training manual were tried out during the final run by the BSCpE fifth year students, and the same students evaluated the activities regarding functionality and relevance. The faculty assessed the modified training manual after the students' evaluation resulted to acceptable functionality and relevance.

Evaluation

The results of the formative evaluation of the laboratory activities in the class served as the basis for further modification of the laboratory training manual. BSCpE and BSECE faculty members evaluated the modified manual. They provided the summative assessment of the developed training manual. The dry run was assessed by the BSCpE students using the pre-experiment activity of the laboratory training manual resulting to a mean rating of 3.09 and standard deviation of 0.14 indicating high functionality and high relevance with a mean score of 3.02 as shown in Table 5a and 5b. The researchers modified the laboratory experiment to include software exploration activities before the conduct of the guided hardware implementation and design applications.

Table 5a

Dry run Evaluation for functionality

	Functionality Indicator	mean	Standard deviation	Descriptive Interpretation
1.	The laboratory manual enabled me to conduct the experiments precisely.	3.05	0.74	High Functionality
2.	The laboratory manual enabled me to interpret data accurately.	3.23	0.56	High Functionality
3.	The laboratory manual enabled me to actively design a system or process to meet desired needs.	3.23	0.56	High Functionality
4.	The laboratory manual enabled me to recognize the applications of control systems.	2.88	0.60	High Functionality
5.	The laboratory manual enabled me to demonstrate the concepts of control systems to others.	3.05	0.65	High Functionality
6.	The laboratory manual enabled me to develop my ability to create and design control systems.	3.29	0.68	High Functionality
7.	The content of the manual is clear, organized, easy to understand, and user friendly.	3.05	0.55	High Functionality
8.	Adequate time is provided to perform the experiment	2.94	0.42	High Functionality
	Over-all	3.09	0.14	High Functionality

The dry run for functionality evaluation yielded high functionality with indicators 2, 3, and 6 having the highest mean ratings while indicators 4, 8, 1,5, and 7 with the lowest mean scores. The lowest indicators were the basis in the modification of the procedures, instructions, and activities by the researchers for the laboratory training manual to improve the functionality of the laboratory training manual.

Table 5b

Dry run Evaluation for relevance

Rel	evance Indicator	mean	Standard deviation	Descriptive Interpretation
1.	I was able to adopt and develop an appropriate design.	2.94	0.65	High Relevance
2.	I realized the need for life-long learning.	3.11	0.48	High Relevance
3.	I was able to use my Investigative skills learn new skills.	3.11	0.48	High Relevance
4.	The experiments developed my design skills.	2.82	0.63	High Relevance
5.	The experiments sharpened my analytical skills.	3.11	0.48	High Relevance
6.	The laboratory manual stimulated my interest to pursue life-long learning.	3.05	0.65	High Relevance
	Over-all	3.02	0.12	High Relevance

The dry run for relevance evaluation yielded high relevance with indicators 2, 3, and 5 having the highest mean ratings while indicator 4, 1, and 6 with the lowest mean ratings. The lowest indicators were the basis in the modification of the procedures, instructions, and activities by the researchers for the laboratory training manual to improve the relevance of the laboratory training manual.

Functionality of the Training Manual

The results of the formative evaluation for functionality are summarized in Table 6a. As gleaned, Experiments 4 and 5 were rated with "Very High Functionality" while the rest of the seven experiments were rated with "High Functionality".



Table 6a

Student Formative Evaluation for Functionality

F	atten alta . In diasta n	Experiment Number										
Fur	ictionality indicator	1	2	3	4	5	6	7				
1.	The laboratory manual enabled me to conduct the experiments precisely.	3.36	3.44	3.50	3.44	3.56	3.43	3.43				
2.	The laboratory manual enabled me to interpret data accurately.	3.24	3.56	3.39	3.61	3.44	3.57	3.43				
3.	The laboratory manual enabled me to actively design a system or process to meet desired needs.	3.06	3.44	3.50	3.44	3.56	3.57	3.30				
4.	The laboratory manual enabled me to recognize the applications of control systems.	3.18	3.39	3.28	3.61	3.67	3.64	3.43				
5.	The laboratory manual enabled me to demonstrate the concepts of control systems to others.	3.18	3.28	3.50	3.67	3.78	3.57	3.43				
6.	The laboratory manual enabled me to develop my ability to create and design control systems.	3.18	3.50	3.44	3.67	3.44	3.50	3.50				
7.	The content of the manual is clear, organized, easy to understand, and user friendly.	3.18	3.39	3.44	3.67	3.56	3.43	3.43				
8.	Adequate time is provided to perform the experiment	3.36	3.39	3.61	3.72	3.50	3.21	3.21				
ov	ER-ALL MEAN	3.21	3.42	3.46	3.60	3.56	3.49	3.40				
Inte	erpretation*	HF	HF	HF	VHF	Interpretation* HE HE HE VHE VHE HE HE						

*HF – High Functionality VHF – Very High Functionality

Table 6b

Over-all Student Formative Evaluation for Functionality

Fur	nctionality Indicator	mean	Standard deviation	Descriptive Interpretation
1.	The laboratory manual enabled me to conduct the experiments precisely.	3.45	0.06	High Functionality
2.	The laboratory manual enabled me to interpret data accurately.	3.46	0.12	High Functionality
3.	The laboratory manual enabled me to actively design a system or process to meet desired needs.	3.41	0.17	High Functionality
4.	The laboratory manual enabled me to recognize the applications of control systems.	3.45	0.18	High Functionality
5.	The laboratory manual enabled me to demonstrate the concepts of control systems to others.	3.48	0.21	High Functionality
6.	The laboratory manual enabled me to develop my ability to create and design control systems.	3.46	0.14	High Functionality
7.	The content of the manual is clear, organized, easy to understand, and user friendly.	3.44	0.15	High Functionality
8.	Adequate time is provided to perform the experiment	3.42	0.19	High Functionality
	OVER-ALL MEAN	3.45	.015	High Functionality

The results of the formative evaluation for functionality are summarized in Table 6b. As indicated, indicator 5, got the highest mean (M = 3.48, SD = 0.21) which implies that the use of the laboratory training manual enables the students to demonstrate the concepts of control systems to others. The evaluation result is supported by the study of Fiesel & Rosa (2005) which revealed that the success of students

learning depends on the accomplishment of the desired task.

On the other hand, the over-all mean (M = 3.45, SD = 0.15) implies that the laboratory training manual is functional in the attainment of the learning outcomes. The top indicators were related to data interpretation, recognition of application of control systems, and demonstration of concepts of control systems while the lowest indicators were in relation to precise conduct of experiments, active design of systems, and time to perform the experiment.

The evaluation results of the faculty in Table 6c depicts the very high functionality of the laboratory training manual (M =3.86, SD = 0.23). The notable mean rating of 4.0 (S.D. = 0) in indicators 1, 2, 4, 5, and 9 affirms the result of Azaman, Rejab, & Rushawida (2013) which emphasized that students should be exposed to practice-oriented design, conduct experiments, and be familiar with engineering instruments and equipment in engineering practice. The conduct of experiments (1), data interpretation (2), recognitions of control system applications (4), demonstrations of control system concepts (5), and development of the ability to plan work (9) were the top indicators while adequacy of time to perform the experiment (8), manual content (7), creating and design of control systems (6), and meeting the desired needs of a system (3) were the lowest indicators for functionality. Results suggest that the laboratory training manual is useful in the performance of activities for the course FCNTRL1.

Table 6c

Over-all Faculty Final Evaluation for Functionality

Fur	actionality Indicator	mean	Standard deviation	Descriptive Interpretation
1.	The laboratory manual enabled me to conduct the experiments precisely.	4.00	0.00	Very High Functionality
2.	The laboratory manual enabled me to interpret data accurately	4.00	0.00	Very High Functionality
3	The laboratory manual enabled me to actively design a system or process to meet	3.75	0.50	Very High Functionality
4.	desired needs. The laboratory manual enabled me to recognize the applications of control	4.00	0.00	Very High Functionality
5.	systems. The laboratory manual enabled me to demonstrate the concepts of control	4.00	0.00	Very High Functionality
6.	systems to others. The laboratory manual enabled me to develop my ability to create and design control systems.	3.75	0.50	Very High Functionality
7.	The content of the manual is clear, organized, easy to understand, and user friendly.	3.75	0.50	Very High Functionality
8.	Adequate time is provided to perform the experiment	3.50	0.57	Very High Functionality
9.	The manual helped me to develop the ability to plan my own work.	4.00	0.00	Very High Functionality
ov	ER-ALL MEAN	3.86	0.23	Very High Functionality

Degree of Relevance

The results of the formative evaluation for relevance are summarized in Table 7a. As revealed, experiments 3 and 4 were rated



with "Very High Relevance" while the rest of the seven experiments were rated with "High Relevance". Therefore, the activities included in the laboratory training manual are relevant to the course FCNTRL1.

Table 7a

Student Formative Evaluation for Relevance

Polovanco Indicator	Experiment Number						
Relevance indicator	1	2	3	4	5	6	7
 I was able to adopt and develop an appropriate design. 	3.00	3.17	3.56	3.50	3.44	3.36	3.50
 I realized the need for life-long learning. 	3.18	3.22	3.50	3.50	3.50	3.21	3.36
 I was able to use my Investigative skills learn new skills. 	3.35	3.00	3.56	3.67	3.50	3.21	3.43
 The experiments developed my design skills 	3.00	2.94	3.50	3.67	3.50	3.21	3.36
5. The experiments sharpened my analytical skills.	3.00	3.17	3.50	3.56	3.44	3.36	3.43
 The laboratory manual stimulated my interest to pursue life-long learning. 	3.29	3.11	3.67	3.61	3.44	3.42	3.50
OVER-ALL MEAN	3.14	3.10	3.55	3.58	3.47	3.30	3.43
Interpretation*	HR	HR	VHR	VHR	HR	HR	HR

*HR – High Relevance VHF - Very High Relevance

The results of the formative evaluation for relevance are summarized in Table 7b. As shown, indicator 6, 3, and 1 got the highest means of 3.43, 3.39, and 3.36, with standard deviations of 0.19, 0.22, and 0.20 respectively, results imply that the use of the laboratory training manual leads to life-long learning, investigative skills, adoption and development of an appropriate design. The results support Chen et al (2015) findings that strategies in the laboratory increase awareness among students and teachers to engage in life-long learning and skill

development. On the other hand, the over-all mean (M = 3.37) with standard deviation of 0.04 implies that the laboratory training manual must be improved to be relevant in the training of students.

Table 7b

Over-all Student Formative Evaluation for Relevance

Fur	actionality Indicator	mean	Standard deviation	Descriptive Interpretation
1.	I was able to adopt and develop an appropriate design.	3.36	0.20	High Relevance
2.	I realized the need for life-long learning.	3.35	0.14	High Relevance
3.	I was able to use my Investigative skills learn new skills.	3.39	0.22	High Relevance
4.	The experiments developed my design skills.	3.31	0.27	High Relevance
5.	The experiments sharpened my analytical skills.	3.35	0.19	High Relevance
6.	The laboratory manual stimulated my interest to pursue life-long learning.	3.43	0.19	High Relevance
ov	ER-ALL	3.37	0.04	High Relevance

The evaluation results of the faculty in Table 7c depicts the relevance of the laboratory training manual with a mean of 3.84 and 0.18 standard deviation with a notable rating for life-long learning, design skills, analytical skills, and personal responsibility for learning.



Table 7c

Over-all Faculty Final Evaluation for Relevance

Functionality Indicator		mean	Standard	Descriptive
	•		deviation	Interpretation
1.	I was able to adopt and develop an	3.75	0.50	Very High
	appropriate design.			Relevance
2.	I realized the need for life-long	4.00	0.00	Very High
	learning.			Relevance
3.	I was able to use my Investigative	3.75	0.50	Very High
	skills learn new skills.			Relevance
4.	The experiments developed my	4.00	0.00	Very High
	design skills.			Relevance
5.	The experiments sharpened my	4.00	0.00	Very High
	analytical skills.			Relevance
6.	The laboratory manual stimulated	3.50	0.57	Very High
	my interest to pursue life-long			Relevance
-	learning.	2 75	0.50	Maria III ala
7.	The laboratory manual gave me	3.75	0.50	very High
	confidence in developing designs			Relevance
8	to meet the needs of a client.	4 00	0.00	Very High
0.	nerconal responsibility for learning	4.00	0.00	Delevence
	personal responsibility for learning			Relevance
0.15		2.04	0.40	Very High
OVE	K-ALL MEAN	3.84	0.18	Relevance
5. 6. 7. 8. OVE	design skills. The experiments sharpened my analytical skills. The laboratory manual stimulated my interest to pursue life-long learning. The laboratory manual gave me confidence in developing designs to meet the needs of a client. The laboratory manual encourages personal responsibility for learning	4.00 3.50 3.75 4.00 3.84	0.00 0.57 0.50 0.00 0.18	Relevance Very High Relevance Very High Relevance Very High Relevance Very High Relevance Very High Relevance

Conclusions and Recommendations

CHED MO 25 S2005, CHED MO 24 S2008, CHED MO 37 S2012, CHED MO 46 S2012, learning outcomes, and resources influenced the design of the laboratory training manual. The study led to the development of the syllabus, student's training manual, and teacher's training manual in Feedback and Control Systems Laboratory for BSECE and BSCpE students of the University of Baguio.

The laboratory experiments relied on the availability of software and hardware devices. The software requirement for the laboratory training manual in the performance of the experiments was a popular open source computing platform supported by any operating system with a multitude of online support and development. The hardware requirements for the development of laboratory experiments in the training manual consists of basic solid state devices such as LEDs, potentiometer, switch, LDR, relay, DC motor, and servomotor interfaced to the Gizduino microcontroller. Digital and analog input interface were used for the switching control of the output devices.

The high functionality and relevance evaluation by the students, and very high functionality and relevance evaluation by the faculty of the developed laboratory training manual denotes usefulness of the laboratory training manual.

Interaction of different factors including the input of the stakeholders, i.e., students and teachers are needed in the attainment of a highly functional and highly relevant laboratory manual.

The completion of the study resulted to the following recommendations:

- Utilization of the completed laboratory training manual in the subject Feedback and Control Systems Laboratory for the University of Baguio BSECE and BSCpE students
- 2. Inclusion of advanced interface devices to the laboratory training manual to heighten the applications of control systems.
- 3. Integrate project presentation at the completion of the laboratory training activities.

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Measuring the satisfaction of students in the ECE laboratory

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ABSTRACT

Measuring students' satisfaction is an area that is very important in every university because the students are its main client. To continue being competitive with other universities, it is important that it continuously learn the level of students' satisfaction with the services they provide. One of the services that a university offers is its laboratory equipment. This study employed descriptive research design to determine the level of satisfaction of ECE students in using the existing ECE Laboratory Equipment and to determine the correlation between students' educational experience in using the laboratory and equipment satisfaction. Findings revealed that students were moderately satisfied regarding the use of the ECE laboratory (M=2.96, SD=0.70). The results further show that students are also moderately satisfied with the services/facilities offered by the ECE laboratory (M=2.98, SD=0.74). The result implies that the students are moderately satisfied with the sufficiency, availability, quality, and functionality of the laboratory equipment. Analysis of variance showed the effect of year level of ECE students on the level of satisfaction using the laboratory equipment/facility, F(3,185)=3.41, p=0.019. Posthoc
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analysis using Tukey's HSD indicated that the mean level of satisfaction for third year ECE students (M=2.89, SD=0.03) is significantly lower than the mean level of satisfaction for the fifth year ECE students (M=3.21, SD=0.05). Pearson correlation coefficient of -.767 indicated that there is a strong negative correlation between educational experience and equipment satisfaction.

KEYWORDS: STUDENTS' SATISFACTION LEVEL, ECE STUDENTS, LABORATORY EQUIPMENT, EDUCATIONAL EXPERIENCE

Introduction

he Electronics and Communications (ECE) department of the University of Baguio considers a hands-on experience in the laboratory to be an essential part of a quality engineering education. From the earliest days of engineering education, instructional laboratories have been a necessary part of undergraduate and graduate programs. Indeed, before the emphasis on engineering science, it could be said that most engineering instruction took place in the laboratory (Feisel and A. J. Rosa 2005).

The importance of laboratories has resulted in much research on how best to conduct them. Most of the research focused on teaching laboratories consists of studies into individual approaches/areas. Howard and Boone (1997) investigated what influenced students to enjoy science laboratories by comparing student satisfaction with an old and newly designed experiment. Boxall and Tait (2008) examined how inquirybased learning affected student satisfaction in a laboratory environment. Gallardo, Barrero, Martinez-Torres, Toral, and Duran (2007) investigated how learner satisfaction could be used to design an electronic laboratory course. These studies have given an awareness of what students find satisfying within the laboratory environment. Teaching laboratories are acknowledged as a unique learning environment, enabling scientific discovery and inquiry-based learning (O'Toole et al., 2012). Laboratories foster a range of skills including communication, knowledge, teamwork, ethics, and encouraging information acquisition (Casas & Hoyo, 2009) and are used to support learning in lectures by enhancing student understanding of theoretical concepts (Chika et al., 2009).

It was highlighted that the importance of laboratories in a study conducted that surveyed all the 34 universities in Australia that provide an engineering degree. The study found that 100% of executive staff believed that the laboratory was integral to engineering education and that 62% of academics think that the laboratory is the essential component of their courses (Kostulski & Murray, 2010).

Physical plant and facilities are significant considerations in developing the proficiency of the students to handle equipment and machines needed for their respective fields of specialization. Making these requirements for the program of study to be utilized by the students is very important for improving the level of confidence and competence (Dotong, 2014).

In the Philippines, a University gains its reputation through accreditation. Accreditation is considered a concept based on selfregulation which focuses on evaluation and the continuing improvement of educational quality and services through self-evaluation and the judgment of peers. A status granted to an educational institution or program which meets commonly accepted standards of quality or excellence. (Ching, 2012). Moreover, one area of this accreditation is the University's laboratory requirement.

The University of Baguio has been evaluated having adequate facilities in attaining its objectives. The autonomous status of the

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University of Baguio was granted to it by the Philippines Association of Colleges and Universities Commission on Accreditation (PACUCOA).

The measurement of student satisfaction can be used by educational institutions, to help them identify their strengths and areas that need improvement. In the Philippines, Higher Education Institutions (HEIs) consider students to be their "primary customers." Students are the primary recipients of the services offered by the school. According to Carey, Cambiano and De Vore (2002), satisfaction covers issues of student's perception and experiences during their college years. Students' achievement brings the institution to a more competitive environment, and it entails continuous improvement of its facilities and services.

The purpose of this study was to determine the level of satisfaction of Electronics Engineering (ECE) students in using the Laboratory equipment/components and their learning experiences with regards to the services provided by the ECE lab. Specifically, the study seeks to answer the following questions:

- 1. What is the level of satisfaction of ECE students in using the existing Laboratory Equipment?
 - 1.1.Is there a significant difference in the level of satisfaction of ECE students in using the current Laboratory Equipment considering their year level?
- 2. What is the correlation between students' educational experience in using the laboratory and equipment satisfaction?
 - 2.1.Is the correlation between students' experiences and equipment satisfaction significant?

Methodology

The study is descriptive quantitative research to determine the

level of satisfaction of ECE students on the experiments in the ECE lab. It also established the level of satisfaction of these students brought about by the learning experience in using the laboratory equipment/components. The primary tool for data gathering is the survey questionnaire instrument. The 4 point Likert-type scale was used for the interpretation, and a reliability test was done.

The questionnaire used in the study contains 14 items. One item is for the overall satisfaction of the students, five (5) parameters are on the aspect of the students' satisfaction with their educational experience, and eight (8) items is concerning the services/facilities offered by the ECE laboratory. The questionnaire's reliability is high as seen with the Cronbach's alpha of 0.935.

Respondents of the study were the ECE students of the University of Baguio. A total of 189 students participated in answering the survey questionnaires. Interview with ECE students per year level in the University was conducted to provide further insight into the results of the survey.

For the analysis of data, this study primarily derives its data from the results of the survey. Weighted means were computed to answer specific problem 1 using Table 1 for its definitive interpretation.

Table 1

Interpretation of Values on level of satisfaction of ECE students

Interval	Level of satisfaction
1.00 - 1.74	Not Satisfied (NS)
1.75 - 2.49	Satisfied (S)
2.50 - 3.24	Moderately Satisfied (MS)
3.25 - 4.00	Highly Satisfied (HS)

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Analysis of Variance (ANOVA) was used to answer problem 1.1. A probability value of lesser than 0.05 was used as a basis to indicate significant differences in the level of satisfaction of ECE students in using the existing laboratory equipment considering their year level.

Pearson correlation was utilized to answer specific problems 2 and 2.1. The scales presented in table 2 in interpreting the correlation values.

Table 2

Interpretation of Correlation Values

Interval	Descriptive Interpretation
About 0.1	Weak correlation
About 0.3	Moderate correlation
0.5 and above	Strong correlation

*Source: Cohen, 1988

The researchers informed the 189 respondents that the survey is on a voluntary basis. Their names were made optional in the survey questionnaire to maintain their anonymity and privacy. Furthermore, the researchers used the data collated for the specific study at hand only. The results of the survey will be disseminated through a research colloquium to be organized by the Research and Development Center (RDC) of the University of Baguio.

Discussion of Results

Table 4 shows the responses provided by the 189 ECE students. The overall satisfaction of the students in their educational experience at the University of Baguio regarding the use of the ECE laboratory is moderately satisfied (M=2.96, SD=0.70) as seen in Table 4 item number 14. The students are also moderately satisfied with the services/facilities offered by the ECE laboratory (M=2.98, SD=0.74). The result implies that the students are reasonably happy with the sufficiency, availability, quality, and functionality of the laboratory equipment. This satisfaction of the students is up for the actuality that the University of Baguio is 82.64% compliant to the minimum requirement of the Commission on Higher Education (CHED) concerning laboratory requisites. The standard deviation is low which means that the respondents' answers are concentrated around the mean. The result indicates that the respondents answered the survey with almost the same satisfaction with the services/facilities offered by the ECE laboratory.

The students are also moderately satisfied with the appropriateness of this equipment with the experiments given to them. The result means that the laboratory equipment functioned adequately to answer the objectives of each experimentation thus letting the students gain confidence in class.



Table 4

Level of Satisfaction of ECE students in using the existing Laboratory Equipment

	Item	м	SD	Descriptive Interpretation
Serv	vices/Facilities			
1.	Sufficiency of laboratory equipment for the students to use.	2.92	0.69	MS
2.	Quality of laboratory equipment.	2.81	0.77	MS
3.	Functionality of the ECE laboratory equipment.	2.90	0.73	MS
4.	Sufficiency of ECE laboratory resources in supporting to attain ECE degree.	2.94	0.72	MS
5.	Availability of help in the use of the equipment when needed.	3.02	0.77	MS
6.	Sufficiency of printed materials' information for the experiments.	3.04	0.76	MS
7.	Objectives of each experiment with the laboratory equipment.	3.14	0.71	MS
8.	Appropriateness of the equipment for the laboratory experiment given to the students.	3.10	0.73	MS
Are	a Mean	2.98		
Star	ndard Deviation	0.74		
Edu	cational Experience			
9.	Confidence gained with the learning experience offered in the ECE laboratory.	2.93	0.75	MS
10.	Satisfaction acquired with the learning process with these ECE laboratory equipment.	2.99	0.72	MS
11.	Improvement of grades with the practical leaning period with these equipment.	3.01	0.75	MS
12.	Opportunity to get guidance with the learning difficulties with the functions of these equipment.	2.99	0.78	MS
13.	Up to date information of equipment for the experiments in the laboratory.	2.78	0.81	MS
Are	a Mean	2.94		
Star	ndard Deviation	0.60		

14.	Overall, how satisfied are you with your	2.96	0.70	MS
	educational experience at the University of			
	Baguio regarding the use of the ECE laboratory?			

Although the students are moderately satisfied, the information regarding the equipment needs to be updated or the material itself since this indicator obtained the lowest mean. The result is valid since some of the apparatus used in the laboratory is already outdated, and its functions deteriorate as its quality.

An interview with students was conducted to strengthen the data gathered from the survey. The students are moderately satisfied with the services/facilities being offered by the ECE laboratory. According to a 4th-year student, "these equipment are helpful tools in providing the knowledge regarding electronics components as we understand the theories behind. "

Again the item on up to date information of equipment for the experiments in the laboratory needs to be addressed since it has the lowest mean. The result is because some types of equipment are old ag ed and no data sheet or table of specifications available.

The standard deviation is low, and it shows that the responses concentrated around the mean. The result means that the respondents answered the survey with almost the same perception of the educational experience offered by the ECE laboratory.

Table 5

Significant difference on the level of satisfaction per year level

Source of Variation	Sum of Squares	df	Mean Squares	F	p-value	F crit
Between	3.17	3	1.06	3.41	0.019	2.65
Within Groups	57.30	185	0.31			
Total	60.47	188				

Table 5 shows the Analysis of variance among the four groups. It showed a main effect of year level of ECE students on the level of satisfaction using the laboratory equipment/facility, F(3, 185)=3.41, p=0.019. Posthoc analysis using Tukey's HSD indicated that the mean level of satisfaction for third year ECE students (M=2.89, SD=0.03) is significantly lower than the mean level of satisfaction for the fifth year ECE students (M=3.21, SD=0.05). This significant difference is brought about by the fact that the third year ECE students are using the ECE laboratory for their essential subjects, and it is their first time using advanced and complicated laboratory equipment while the fifth year ECE students had been into it for at least one year.

However, the mean level of satisfaction did not differ significantly between fourth-year ECE students (M=2.91, SD=0.03) and second-year ECE students (M=2.95, SD=0.11). The result is brought about by the reality that second-year ECE students were given experiments which use basic laboratory equipment, and the fourth-year ECE students are already equipped on how to use this equipment.

Table 6

Correlation between Educational Experience and Equipment Satisfaction

		Equipment Satisfaction	Educational Experience
Equipment Satisfaction	Pearson Correlation	1	767
	Sig (2-tailed)		0.130
	Ν	8	5
Educational Experience	Pearson Correlation	767	1
	Sig (2-tailed)	0.130	
	Ν	5	5

Table 6 shows the correlation coefficient of -.767 which means that there is a strong negative correlation between educational experience and equipment satisfaction. This correlation is not significant (p=0.130) as to the students being satisfied with the educational experience they gain from the ECE laboratory services/facilities. The result is justified since the fifth year students have more experience in handling the laboratory equipment compared to the lower year students who are into this equipment for at least two years. An interview with a fifth-year student further justified this result by saying, "Most of the things I know today which relates to my course are due to the practical or hands-on activities. These activities were a great help in my learning experience." In which she is referring to the activities given and not the equipment they are using.

Table 7

Correlation between Educational Experience and Equipment Satisfaction

per	year	level	
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Year			Equipment	Educational
Level			Satisfaction	Experience
2 nd Year	Equipment	Pearson Correlation	1	758
	Satisfaction	Sig (2-tailed)		0.138
		Ν	8	5
	Educational Experience	Pearson Correlation	758	1
	Experience	Sig (2-tailed)	0.138	
		Ν	5	5
3 rd Year	Equipment	Pearson Correlation	1	568
	Satisfaction	Sig (2-tailed)		0.318
		Ν	8	5
	Educational Experience	Pearson Correlation	568	1
		Sig (2-tailed)	0.318	
		Ν	5	5
4 th Year	Equipment Satisfaction	Pearson Correlation	1	888
		Sig (2-tailed)		0.044
		Ν	8	5
	Educational Experience	Pearson Correlation	888	1
		Sig (2-tailed)	0.044	
		Ν	5	5
5 th Year	Equipment Satisfaction	Pearson Correlation	1	837
		Sig (2-tailed)		0.077
		Ν	8	5
	Educational	Pearson Correlation	837	1
	Experience	Sig (2-tailed)	0.077	
		Ν	5	5

Table 7 shows that there is a strong negative correlation between educational experience and equipment satisfaction in all the year level of ECE students who participated in the study. This correlation is not significant, except for the 4th year students, since the students believed that they gain knowledge and confidence through the experiments given to them and not on the results presented by the laboratory equipment.

As part of the survey questionnaire, the strength, and weaknesses of the ECE laboratory. One of the advantages of the ECE laboratory as seen by the students is the availability of equipment and its staff. On the contrary, they suggested that the space of the working area in the laboratory is one of its weaknesses. There is not enough space to work especially if the experiments require a larger space for the laboratory equipment alone. Though apparatus is available, some of which are outdated, not in sound quality and not functioning correctly which in return becomes the weakness of the ECE laboratory.

Conclusions and Recommendations

School facilities are one of the attributes that students see before considering to enroll in any institution. Part of these facilities is the laboratory where hands-on learning and teaching take place. One of the laboratories that are within the University of Baguio is the ECE laboratory where ECE students do their experiments as well as experience handson training. Moreover, it is of importance to know if the students are satisfied with the services and educational experience they receive from this facility.

As a result, the overall satisfaction of the students in their educational experience at the University of Baguio regarding the use of the ECE laboratory is moderately satisfied. The students showed that they are satisfied with sufficiency, availability, quality, and functionality of the laboratory equipment. The students are also moderately satisfied with the services/facilities offered by the ECE laboratory. They are moderately satisfied with the appropriateness of this laboratory equipment with the experiments given to them. The laboratory equipment functioned as a tool to answer the objectives of each experimentation thus letting the students gain confidence in class.

The students are moderately satisfied with their educational experience provided by the laboratory equipment. Their hands-on training contributed to the improvement of their grades as they are the ones connecting and designing the circuits with the components and equipment. Although the students are moderately satisfied with the educational experience they gain, still up to date information on equipment for the experiments is missing. The reason for this is due to some equipment/component are already old aged, and no data sheets are available.

The number of years that the students have in handling this laboratory equipment gives a difference. The study shows that there is a significant difference in the level of satisfaction using the laboratory equipment/facility.

There is also a strong negative correlation between educational experience and equipment satisfaction. Moreover, this correlation is not substantial as to the students being satisfied with the educational experience they gain from the ECE laboratory services/facilities. The relationship of educational experience and equipment satisfaction is not significant, except for the 4th year students.

The strength and weaknesses of the ECE laboratory were also mentioned. One of the advantages of the ECE laboratory as seen by the students is the availability of equipment and its staff. On the contrary, they suggested that the space of the working area in the laboratory is one of its weaknesses. There is not enough space to work especially if the experiments require a larger space for the laboratory equipment alone. Though apparatus/equipment is available, some of which are outdated, not in sound quality and not functioning correctly which in return becomes the weakness of the ECE laboratory.

Raising the level of student satisfaction in the laboratory or any facility of the University can be a way of attracting enrollees. It also improves the laboratory experience and reinforces the learning experience of the students. The study then recommends the following to enhance the level of satisfaction of the students in the ECE laboratory:

Purchase equipment to satisfy CHED and actual class requirements for the students to have an up to date information regarding the equipment/component. The old ones should be calibrated at least twice in a semester to ensure quality and functionality. The purchase will give enough laboratory equipment.

The students will much appreciate the availability of information with regards to this equipment. The report will enhance their learning experience because they will be able to see the connection between theory and practical applications. The working area is not efficient in a sense that it can only accommodate a limited number of students and not a large area to do experiments. The recommendation to this is that the number of students is limited if not construct a more comprehensive space as a laboratory.

Though the staffs are very efficient and accommodating, still there is a need for an addition of two more personnel to cater to the needs of the students. As of this study, the number of staff in the laboratory is not enough to accommodate 2 to 3 laboratory classes simultaneously using the laboratory.



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