

ACADEMIC PROFICIENCY, INTERNSHIP PERFORMANCE RATING, AND THE PREPAREDNESS TO ASCP CERTIFICATION OF THE MEDICAL TECHNOLOGY GRADUATES IN REGION XI: BASIS FOR THE ENHANCEMENT OF CLINICAL INTERNSHIP CURRICULUM

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Abstract: *Medical Technology/ Medical Laboratory Science (MT/MLS) graduates seeking employment abroad first need to pass certain foreign government standard tests. The study investigated the preparedness to American Society for Clinical Pathology (ASCP) certification examination of local MT/MLS graduates based on their academic performance and internship performance rating. Specifically, the study aimed to evaluate the MT/MLS graduates' level of preparedness to ASCP examination and their academic and internship performances, and whether the latter two could be used to predict the former. Purposive sampling technique was used to select the 177 MT/MLS graduates of batch 2014 from Region XI. The data were gathered using validated researcher-made questionnaire, and analyzed using Pearson R and Multiple Regression analysis. The results showed that there is a significant direct, high correlation between the MT/MLS graduates' academic performance and their preparedness to ASCP examination ($r = .810, p < .05$), implying that an increase in academic performance of the graduates corresponds to an increase in their level of preparedness to ASCP examination. Likewise, there is a significant direct, moderate correlation between the MT/MLS graduates' internship performance rating and their preparedness to ASCP examination ($r = .663, p < .05$), implying that the higher the internship performance rating of the MT/MLS graduates, the higher is their level of preparedness to ASCP examination. Further, between the two predictors, academic proficiency is the significant factor ($\beta = .860; p < .05$) that influences the level of preparedness of the graduates to ASCP examination, whilst the internship performance rating showed no significant influence ($\beta = -.060; p > .05$) to the level of preparedness of the graduates to ASCP examination. This study will provide information as basis for improvement of the MT/MLS Clinical Internship Curriculum in the Philippines.*

Keywords: *Academic Proficiency, Internship Performance Rating, ASCP Certification Examination, National Licensure Examination (NLE) Rating*

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INTRODUCTION

In a rapidly changing world with diverse demands and challenges, governments are increasingly depending on universities to produce human resources with the right kind of capacities, skills and knowledge to meet the 21st century needs. Governments rely on universities to facilitate the shift to a knowledge-based and high-technology economy to ensure a competitive edge in global markets. Preparing young people for the labor market has therefore become a critical responsibility for universities. Many economies, especially that of developing countries, are reported as not generating sufficient employment opportunities to absorb growth in the working-age population, and a generation of young productive workers will face an uncertain future, unless this trend is reversed (UNESCO, 2012).

Conversely, a surplus of employment opportunities has been evident in developed economies like United States, Canada and Australia. According to the US Coordinating Council on Clinical Laboratory Workforce, 150,000 new technologists were required in 2014 and 40% of laboratorians will be retiring in the next 10 years. Further, employment of clinical laboratory workers is expected to grow by 14% between up to 2018, faster than the average for all occupations (Bureau of Labor Statistics, 2014).

These contrasting landscapes of employment shortage for rising number of graduates in developing countries and employment surplus for a limited workforce in developed countries have not only severed the competition amongst graduates from developing countries but also stiffened standard professional requirements in developed countries. Hence, the global healthcare industry has set *competency standards* for healthcare practitioners to assure having highly skilled and educated medical professionals.

Competency is the ability to perform the activities within an occupation to expected standards (Australian National Training Board, 1998), and classified into general competencies referring to a particular profession, e.g. *general competencies* of medical technology / medical laboratory science (MT/MLS) profession and *task-specific competencies* referring to specific disciplines in the practice of a profession, e.g. hematology, microbiology, etc. for MT/MLS profession. In the context of MT/MLS graduates, these core competencies are gained through educational programs and learning experiences especially in clinical internship programs. In these respect, to qualify non-citizen MT/MLS graduates, foreign governments require them to pass especially designed competency-based examinations.

For instance, the United States has long necessitated non-US MT/MLS graduates to pass the competency-based certification examinations administered by the *American Society for Clinical Pathology* (ASCP) together with the *American Medical*

Technologists (AMT) and *American Society for Clinical Laboratory Science* (ASCLS), prior to their acceptance in medical institutions in the US. The ASCP credential carries the weight of eighty years of expertise in clinical laboratory professional certification, which serves as a symbol of commitment to the highest standards of the profession and to quality patient care (ASCP, 2013).

The Philippines has strategically assumed a position of providing needed healthcare workforce in developed countries. This is evidenced by the fact that since the 1960s, the country has sent the largest number of professional immigrants to the United States, majority of whom are Filipino healthcare practitioners. Furthermore, the results of a tracer study conducted by the College of Medical Technology of the Lyceum of Batangas on the status of their graduates, indicated that many have already migrated to other countries like the United States, Australia, Canada, Saudi Arabia and other Asian countries where these graduates were able to practice their profession in various specialized areas in the clinical laboratories of hospitals, for which they have satisfied “competency-based” certification examinations (Valdez, 2010).

As the US Board of Registry (BOR) reported, ASCP is addressing the protection of the health and safety of the public, hence affording the standardized testing and certification internationally to such countries as South Korea, the Philippines, Panama, and Hong Kong. As of December 2012, ASCP has certified more than 2,000 Medical Technologists in the Philippines alone (ASCP, 2013; BOR Newsletter, 2013). But ASCP did not come up with the detail on the total percentage of the entry level medical technologists in the Philippines who did pass or fail in the ASCP certification examination. Considering the fact that the *Philippine Regulation Commission* (PRC) registers approximately more than 1000 new medical technologists each year, the over 2000 ASCP-certified medical technologists of the country still make up a very low number, and not sufficient to claim that Philippine HEIs produce medical technologists who are competent enough to pass the ASCP examination. Clearly, the content of non-US MT/MLS programs are challenged by the standards of excellence mirrored in ASCP examination. Curricular evaluation and reform is therefore necessary to improve the country’s quality of medical technology education and graduates. The *Teacher Education Accreditation Council* (TEAC) Guide to Accreditation (2012) enumerated twenty points of evidence that can support a program’s claim that its graduates are competent, caring, and qualified. Although not all categories of evidence may be used, three areas that are available to most programs are student’s cumulative *grade point averages* (GPA), *field clinical internship ratings*, and *standardized license or board examination scores*.

Assessing factors that may influence students’ preparedness to take the ASCP certification examination is very important because taking the actual ASCP

examination here in the Philippines is very expensive. Aside from the fact that the examinee is required to pay ASCP BOC an amount of USD 200, the examination is conducted only in the city of Manila, thus graduates from the provinces, like those from Davao City, still need to spend for airfare and other expenses during the examination. Hence, practical and economic reasons encouraged the researcher to look at the local MLS graduates' competencies if these were aligned to the core competencies of the ASCP standards needed to pass the ASCP certification examination. More so, the researcher is enthused with a desire to help the academe update and enhance MT/MLS curriculum to conform to international standards, so that local graduates could succeed foreign certification examinations hence compete in the bigger global market.

It is in this light that the researcher ventured to conduct this investigation amongst MT/MLS graduates of the three medical technology schools in Region XI, to find out if their academic performance and internship performance rating can be used to predict their preparedness to ASCP certification examination. The results of this investigation will help the researcher to identify the specific weak areas of competencies of MT/MLS graduates in the ASCP certification, hence possibly come up with a targeted MT/MLS curriculum enhancement plan.

Study Objectives

This study aimed to provide the technical panel of the Commission on Higher Education (CHED) for medical technology education, MT/MLS school administrators and Philippine Association of Medical Technologists (PAMET) with useful data that will determine whether preparedness to ASCP certification examination of MT/MLS graduates can be predicted by their academic and clinical internship proficiencies. As human healthcare and safety needs evolve, the healthcare industry also constantly revolutionize in terms of service delivery, globalization strategies and standards stringency.

Specifically, this study sought to answer the following questions:

1. What is the level of Academic proficiency of the graduates from the MT/MLS Schools in Region IX in terms of:
 - 1.1 Weighted Percentile Average (WPA) and
 - 1.2 National Licensure Examination (NLE) Rating?
2. What is the level of internship performance rating of the graduates from the MT/MLS Schools in Region XI?
3. What is the level of preparedness to ASCP certification examination of the MT/MLS graduates in Region XI to in terms of:

- 3.1 Knowledge;
- 3.2 Technical Skills;
- 3.3 . Problem Solving and Analytical Decision Making;
- 3.4 Communication;
- 3.5 Teaching and Training Responsibilities; and
- 3.6 Supervision and Management?
4. Is there a significant relationship between the academic proficiency and the level of preparedness to ASCP certification examination among the MT/MLS graduates in Region XI?
5. Is there a significant relationship between the internship performance Rating and the level of preparedness to ASCP Certification examination among the MT/MLS graduates in Region XI?
6. Is the level of preparedness to ASCP Certification examination significantly influenced by each of the following:
 - 6.1 Academic Proficiency of the MT/MLS graduates and
 - 6.2 Internship Performance Rating of the MT/MLS graduates?
7. On the basis of the results, what MT/MLS curriculum enhancement can be proposed?

Theoretical Framework

This study is grounded on several learning theories such as the Social Learning Theory (Bandura, 1977), the Constructivist Theory (1960) and the Social Development Theory by Vygotsky (1896-1934).

The Social Learning Theory (Bandura, 1977) emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others, which explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences. Social learning theory has been applied extensively to the context of behavior modification (Bandura, 1969). It is also the theoretical foundation for the technique of behavior modeling which is widely used in training programs.

The Constructivist Theory (Bruner, 1960) states that learning is an active process in which learners construct new ideas or concepts based upon their current/past knowledge. In this light, the instructor should try and encourage students to discover principles by themselves, and translate information to be learned into a format appropriate to the learner's current state of understanding. Curriculum should be organized in a spiral manner so that the student continually builds upon

what they have already learned.

The Social Development Theory by Vygotsky (1896-1934) argues that social interaction precedes development; consciousness and cognition as the end product of socialization and behaviour. Vygotsky posits that an ideal environment that fosters healthy cognitive development, children's caregivers, teachers and more mature peers will provide them with experiences and tasks that fall within their zone of proximal development. Such experiences, accompanied by appropriate prompting, questioning, and adjustments (so as to match demands to children's skill level) will create the best possible environmental conditions necessary to facilitate children's growth.

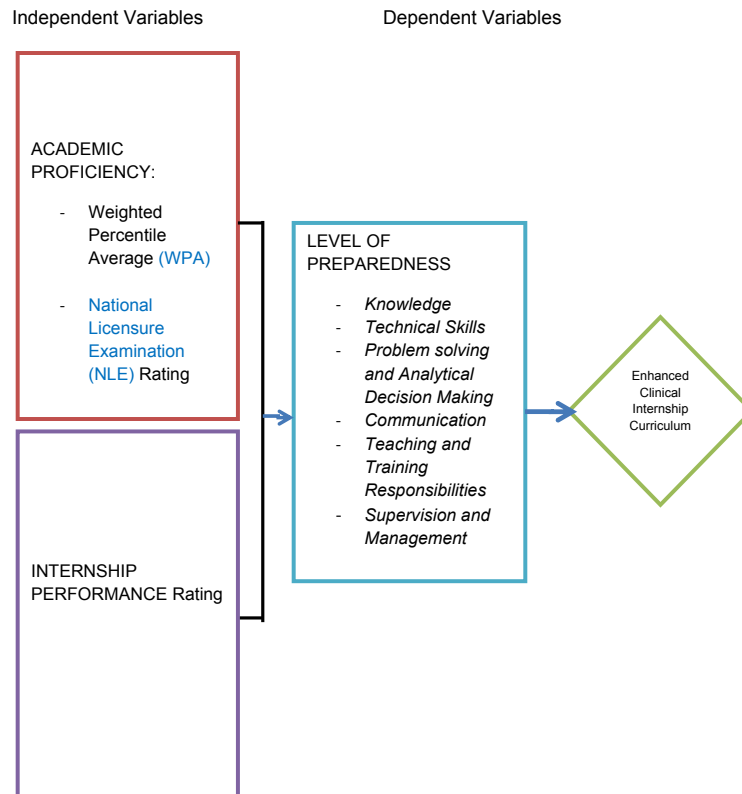
Additionally, the study is justified by related studies of Naron and Wedlack (1991) who ventured on an ex post facto study on the predictive variables on National Council for Licensure Examination for Registered Nurse (NCLEX-RN) performance of students in Chicago Illinois' Olive-Harvey College, which found that grades in nursing and in pre-nursing courses had significant influence over their performance in the examination. Further, McClelland (1992) also undertook a study on academic variables affecting the performance of baccalaureate nursing graduates on NCLEX-RN. These same variables were also identified in the study of Lin & Fung (2003). In synthesis, licensure examination performance can be mostly predicted by grade point average and qualifying examination in college as revealed by related studies. Further, performance in the examination can also be significantly influenced by schools' retention policies, but is insignificantly related to faculty qualification as basis for formulating interview questions (AMT journal, 2002).

Conceptual Framework

This study deeply investigated if the ASCP competency attributes to entry level ASCP certification of the MT/MLS graduates from the three Medical Technology Schools in Region XI can be predicted based on their WPA, NLE rating and internship performance rating.

Figure 1 shows the conceptual model summarizing the independent and dependent variables of the study. The independent variables of the study are the academic performance and internship performance rating of the MT/MLS graduates. The academic performance is divided into sub-variables *WPA* and *NLE rating*. The dependent variable, on the other hand, is the level of preparedness of the students, which is anchored on ASCP certification examination six core competencies namely *knowledge, technical skills, problem solving and analytical decision making, communication, teaching and training responsibilities, and supervision and management*, which are briefly defined herein.

Figure 1: The Conceptual Framework of the study



Competency One, *Knowledge*, tests the technologist’s understanding of the underlying scientific principles of laboratory testing, technical, procedural, and problem-solving aspects. The technologist is able to comprehend factors that affect health and disease; recognize proper tests and correlate abnormal laboratory data with pathologic states, determine validity of test results; use statistical methods, business and economic data in decision making; appreciate the roles and interrelationships of health-related fields; and follow the ethical code of conduct for the profession.

Competency Two, *Technical Skills*, tests the technologist’s capability to perform and interpret standard, complex and specialized tests. The technologist is able to understand quality assurance sufficient to implement and monitor quality control programs; introduce, investigate and implement new procedures and evaluate new instruments and computer-generated data and troubleshoot problems to insure proper laboratory operation.

Competency Three, *Problem Solving and Analytical Decision Making*, tests the technologist's ability to exercise initiative and independent judgment in dealing with the broad scope of procedural and technical problems. The technologist is able to participate in decisions involving quality control and assurance, instrument and method selection, preventive maintenance, safety procedures and reagent purchases, test selection/ utilization, research procedures, and computer/statistical data.

Competency Four, *Communication*, tests the technologist's capacity to communicate technical information such as test results inquiries, methodology, test specificity, sensitivity and specific factors that influence results to other health professionals and consumers. The technologist develops acceptable criteria, laboratory procedure manuals, reports, guidelines, and research protocols.

Competency Five, *Teaching and Training Responsibilities*, tests technologist's capacity to provide instruction in theory, technical skills, safety protocols, and application of laboratory test procedures. The technologist provides continuing education for laboratory personnel, maintains technical competence and participate in the evaluation of the effectiveness of educational programs.

Competency Six, *Supervision and Management*, tests the technologist's management theory understanding, economic impact and management functions. The technologist participates in and takes responsibility for establishing technical and administrative procedures, quality control and assurance, safety and waste management procedures, information management and cost effective measures; and supervises laboratory personnel.

METHODOLOGY

Research Design

The study utilized the survey approach of research precisely the descriptive correlation method, which measures relationships between two or more variables and gives an indication of how one variable may predict another. The said approach is used as much as the principal rationale for studies that figure out the problems and/or situations under such factors that mostly affect student performances. MLS graduates from the different schools in Region XI were asked to answer the researcher-made questionnaire patterned after the core competencies of ASCP examination for entry level medical technologist. In order to determine the factors that affect student's performance, the quantitative research techniques were used particularly the Likert Scale. This is to determine the relationship between the variables of the study without trying to influence them. It also attempts to describe the existing relationship among the variables of the present time, not the present

moment.

Research Locale

The study was conducted in Region XI where the three MT/MLS schools are located. The said schools are the Mindanao Medical Foundation College (MMFC), San Pedro College (SPC), and the University of the Immaculate Conception (UIC). The three schools are all situated in Davao City, Philippines. MMFC began as a Medical School in 1979. It is a private, non-sectarian Medical Institution which offers medical related courses. Its curricular offerings include Bachelor of Science in Nursing, Bachelor of Science in Physical Therapy, Bachelor of Science in Pharmacy, Bachelor of Science in Medical Technology, and Midwifery. On the other hand, SPC was founded in 1956 by the Dominican Sisters of the Trinity from Quebec, Canada. It started as a school of nursing of the San Pedro Hospital, the first Catholic hospital in Mindanao, which the religious sisters have been operating since their arrival in 1948. Likewise, UIC is a Catholic University owned and run by the Religious of the Virgin Mary (RVM) since 1905. It has three campuses, namely the Main campus in Fr. Selga Street, Davao City, the Annex campus in Bonifacio Street, Davao City and the Basic Education campus located in Bajada, Davao City.

Research Respondents and Sampling

Purposive total enumeration sampling design was employed in selecting the study respondents. Out of all batch 2014 MT/MLS graduates from the three medical technology schools in Region XI, a total of 177 graduates who at the same time were preparing for the National Licensure Examination (NLE) were purposively selected as respondents. This number of respondents represents a total enumeration of graduates who sat down for the NLE set by PRC for MT/MLS graduates on the same year. Thus, the number of the sample population consisted of all graduates that completed MT/MLS program and who also took the NLE in September 2014.

To avoid bias in the investigation, the researcher made sure that the respondents who were included in the study were then reviewing for the MT/MLS National Licensure Examination since, as observed; those who are taking the actual ASCP certification examination are either enrolled in a review center or are in a self-study prior to taking the actual certification examination. No compensation was provided to the participants, and they were not interviewed, tested or surveyed beyond the normal requirements.

Research Instrument

A Self-made questionnaire containing a 100-item multiple choice questions, which are highly selected from pooled questions gathered from reliable and known

Review Centers for ASCP in the Philippines and from certified ASCP Medical Technologists working in Davao City, was used in the study. The construction of the questionnaire was patterned after the examination model of the International Medical Technologist, MT (ASCP) Examination content guidelines for entry-level medical technologist. The questionnaire consists of three interrelated components namely *Competency Statements*, *Taxonomy levels* and *Content Outline* to assess students' preparedness to take the ASCP certification examination.

The Competency Statements describe the skills and tasks that Medical Technologists should be able to perform, and anchored on ASCP six core competencies such as knowledge (competency one), technical skills (competency two), problem solving and analytical decision making (competency three), communication (competency four), teaching and training responsibilities (competency five), and supervision and management (competency six).

The Taxonomy levels were considered in making the questionnaire to evaluate the level of cognitive skills required of the medical technologist in answering the questions. Level One, *Recall*, tests the ability of the medical technologist to recognize previously learned (memorized) knowledge ranging from specific facts to complete theories. Level Two, *Interpretive Skills*, tests the ability of the medical technologist to utilize recalled knowledge to interpret or apply verbal, numeric or visual data. Level Three, *Problem Solving*, tests the ability of the medical technologist to utilize recalled knowledge and the interpretation/application of distinct criteria to resolve a problem or situation and/or make an appropriate decision.

It is also in these levelling where the six core competencies are anchored and described. Competency One was anchored in Taxonomy Level One; Competencies Two and Four were anchored in Taxonomy Level Two, while Competencies Three, Five and Six of the higher thinking levels were categorized under Taxonomy Level Three.

The Content Outline was included to delineate general categories or subtest areas covered. Hence, the questionnaire was designed to include the following subject areas and their equivalent percentages based on the standard ASCP exams: Blood Bank, 17% of the total examination; Urinalysis and other Body Fluids, 8%; Chemistry, 21%; Hematology, 20%; Immunology, 8%; Microbiology, 20%; and Laboratory Operations, 6% of the total examination. (Please see Appendix B for the specific subtopics).

The questionnaire was made with Table of Specification (TOS) to determine the proper distribution of the six core competencies with its total number of items per competency. There are 47 questions that would test the knowledge competency of the graduates; 20 questions for technical skills; 23 questions to assess the

problem solving and analytical decision making of the graduates; three questions for communication; four questions for teaching and training responsibilities and three questions to evaluate the supervision and management competency of the graduates (Please see Appendix D for the TOS).

In the actual ASCP examination, the examinee performance report provides the scaled score on the total examination and pass/fail status for all candidates. In addition, failing candidates receive scaled scores for each subtest. This information may help the examinee identify areas of strengths and weaknesses in order to develop a study plan for future examinations. A total scaled score of 400 over 999 is required to pass the examination. Following the pattern to identify pass and fail status, the researcher assigned certain points for each competency to identify the capacity of the Medical Technology graduates to pass the ASCP examination. Competency one (Taxonomy Level 1) is assigned a corresponding point of eight (8); Competencies two and four (Taxonomy Level 2) are assigned with 10 points; Competencies three and five (Taxonomy Level 3) are assigned with 13 points; and Competency 6 (Taxonomy Level 3) is assigned with 14 points to reach a scaled score of 999 points which is equivalent to 100-item multiple choice questions.

The questionnaire has face validity as revealed since it was supported by a TOS. After it was finalized, the instrument was then pilot-tested among selected MT/MLS graduates of batch 2014 and these students were excluded in the main study. The questionnaire was also evaluated by five ASCP Medical Technologists and was pilot-tested among the selected MLS graduates of batch 2014 for reliability. After the examination was rendered among the respondents, each item in the examination was analyzed and the data were matched as to the competencies enumerated to assess the level of preparedness of each respondent to ASCP certification examination.

The WPA and Internship Performance Rating of individual respondent's were requested from the respective school Registrars, while the individual official result of the NLE rating was obtained from the PRC through the Program Heads of each Medical Technology Schools. The Level of preparedness to ASCP certification of each of the respondents was obtained after they took the examination prepared by the researcher which was patterned after the standard review materials released by the ASCP BOC.

Data Gathering and Procedure

The gathering of data was also supported by the approved letter of permission from the respective schools' Research Director and Registrar. While the Batch 2014 MT/MLS graduates were gathered in their respective schools and / or review centers in Davao City as they prepare for MT/MLS NLE, the researcher took the opportunity

to explain to the respondents the importance of their participation in the study. They were oriented with the informed consent stipulating that they are allowing the researcher to obtain the official results of their WPA, Internship Performance Rating, and NLER from their respective schools. After no more questions were raised regarding the details of the study, the signed informed consent forms were gathered from the respondents.

In handling the respondents during the conduct of the self-made ASCP certification exam, the researcher explained carefully that each item in the examination should be answered honestly as it applied to them so that an ingenuous status of their preparedness to take the actual ASCP certification examination can be assessed and determined.

Ethical Considerations

The core principles of research ethics namely *Respect for Persons* and *Beneficence*, to ensure the autonomy of and benefits for research participants (Belmont, 2000) were observed in the conduct of this research. Hence, the researcher satisfied the following elements of informed consent: 1) purpose of the research; 2) what is expected of a research participant, including the amount of time required; 3) expected risks and benefits; 4) the fact that participation is voluntary and that one can withdraw at any time with no negative repercussions; 5) how confidentiality will be protected; and 6) the names and contact information of the persons to be contacted for questions related to the study and about one's rights as a research participant.

Likewise, permissions to gather data for analysis from the three MT/MLS schools in Region XI and to render the self-made ASCP examination questionnaire were secured.

Finally, for the benefit of the participating schools, the researcher would give them feedback about the outcome of the study upon the approval of the overall completed study by the panel members.

Statistical Treatments

The Pearson R was used to determine the relationship between the academic proficiency, internship performance rating and the level of preparedness of MT/MLS graduates to entry-level medical technologist ASCP certification examination. Multiple Regression was used to determine the extent of influence of the academic proficiency, internship performance rating and the level of preparedness of MT/MLS graduates to entry-level medical technologist ASCP certification examination

The ratings used to analyze the data gathered in order to predict the preparedness of MT/MLS students to ASCP certification exam is as follows:

<i>Grade:</i>	<i>Descriptive Rating:</i>	<i>Interpretation:</i>
95 – 100	Very High	Excellent
90 – 94	High	Very Good
85 – 89	Moderate	Good
80 – 84	Low	Average
75 – 79	Very Low	Fair
74 – below	Failed	Poor

RESULTS AND DISCUSSION

This chapter organized the data collected in this study. Statistical analyses were conducted on the findings derived from the study to answer the hypotheses stipulated in this research. The sections and subsections are arranged in a manner how the problems of this study were consecutively dealt with.

A total sample of 177 MT/MLS graduates of batch 2014 participated in the study. The data were gathered to know if the academic performance and the internship performance rating of the MT/MLS graduates could serve as predictors to their level of preparedness to ASCP certification examination. Academic performance is reflected by the MT/MLS graduates' WPA and NLE rating while the internship performance rating is the summative reflection of performance during their actual clinical exposure. The ASCP Certification examination is a standardized examination set by the ASCP BOC especially for the entry-level medical technologists who meet the academic and clinical prerequisites. The certification is given to them if they achieve acceptable performance levels on examinations.

Table 1
Levels of academic proficiency and internship performance rating of the MT/MLS graduates in Region XI

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Descriptive Rating</i>	<i>Interpretation</i>
Academic Proficiency	177	82.70	3.17	Low	Average
WPA	177	83.04	3.52	Low	Average
NLE	177	82.36	3.84	Low	Average
Internship	177	81.26	3.23	Low	Average

Legend: 95-100- Very High 90-94-High 85-89-Moderate 80-84-Low 75-79-Very Low 74-below-Failed

Table 1 shows that the academic proficiency of the MT/MLS graduates in Region XI, as computed based on the WPA and NLE rating, reflects a mean of 82.70, which is rated low and interpreted as the graduates having an average academic proficiency. On the other hand, their internship performance rating reflects a mean of 81.26, is rated low and can be interpreted that they have average internship performance rating.

The academic proficiency, as supported by the WPA results, signifies that the MT/MLS graduate respondents are only average achievers. Based on the actual WPA rating, 92 out of 177 (51.98%) respondents got a grade within 80-84 which means that majority of them are academically average achievers.

This average performance level of the respondents is also reflected in their NLE ratings. Based on the actual data on the respondents' NLE ratings, 94 out of 177 (53.11%) MT/MLS respondents who took the September 2014 NLE got grades within 80-84 which means that more than half of them showed an average performance rating.

Likewise, the respondents had consistently shown an average performance level during their clinical rotation. As reflected by the actual internship rating of the respondents, 108 out of 177 (61.02%) got an internship grade of 80-84 which also represent the average clinical performance of the respondents.

Thus, as both the academic proficiency and internship ratings of the respondents were established to be only on the average level, it is interesting to see how this is associated with their preparedness to ASCP certification exam. Would this mean that the MT/MLS graduates of batch 2014 also just have an average chance to pass the actual ASCP certification examination? Based on the actual ASCP certification exam, the examinee is only required a total scaled score of 400 points out of 999 points in a 100-item multiple choice questions to pass the exam (ASCP BOC, 2013). Thus, a 400 points in a 999- point certification exam is estimated to be equivalent only to 74.82%. The respondents' academic performance and internship performance ratings at 82.70% and 81.26% respectively, are far higher than the 74.82% estimated ASCP passing rate. As such, it can be deduced that the respondents are average intellectual personalities who might naturally possess a tantamount level of preparedness to the ASCP certification examination. This is elucidated in the next table.

To examine the MT/MLS graduate respondents' preparedness to ASCP certification examination, they were assessed in terms of the six ASCP core competencies, and the results are presented in table 2. Out of the six competencies defined in the ASCP certification examination, the respondents got a *low* rating in three competencies, namely knowledge (competency one), technical skills

(competency two), and problem and analytical decision making (competency three) with means of 81.60, 81.49, 81.38, respectively. These ratings imply that the preparedness to ASCP certification examination of the MT/MLS graduates in Region XI in terms of knowledge, technical skills, and problem and analytical decision making is average.

Table 2
Level of preparedness in terms of the different competencies to ASCP certification examination of the MT/MLS graduates in Region XI

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Descriptive Rating</i>	<i>Interpretation</i>
Preparedness	177	80.26	3.80	Low	Average
Knowledge	177	81.60	4.37	Low	Average
Technical Skills	177	81.49	5.54	Low	Average
Problem Solving & Analytical Decision Making	177	81.38	5.35	Low	Average
Communication	177	70.66	10.20	Failed	Poor
Teaching & Training Responsibilities	177	63.58	7.51	Failed	Poor
Supervision & Management	177	74.77	11.75	Failed	Poor

Legend: 95-100- Very High 90-94-High 85-89-Moderate 80-84-Low 75-79-Very Low 74-below-Failed

As such, per description of ASCP core competencies one to three, it can be supposed that the respondents generally have understanding of the underlying scientific principles of laboratory testing, technical, procedural, and problem-solving aspects; have modest skills to perform standard, complex and specialized tests, and to exercise initiative and independent judgment in dealing with the broad scope of procedural and technical problems.

Poignantly, the respondents got *failed* ratings in the other three competencies, namely communication (competency four), teaching and training responsibilities (competency five), and supervision and management (competency six), with means of 70.66, 63.58, and 74.77, respectively, and are interpreted as poor performance.

As such, per descriptions of the ASCP core competencies expected of the technologists, the results can be interpreted as the respondents being very poor

in communicating to others technical information like laboratory test results, procedures, specificity, sensitivity and specific factors that influence results; and that they are unable to instruct theories, technical skills, and safety protocols, and to apply laboratory test procedures, as well as to fathom management theories, economic impact and management functions.

The average rating in knowledge, technical skills, problem and analytical decision making of the respondents could be because they are just fresh graduates and had no experience yet working as medical technologist. According to Valdez (2010), the medical technologist length of stay in their place of work hones the knowledge, skills, attitudes and belief of the professionals as they imbibe organizational culture, policies and guidelines in the respective hospitals where they work.

Whereas the failed rating that the respondents got for communication, teaching and training, supervision and management problems could, at the outset, be communication and cultural problem. This is because Filipinos are technically not native English speakers and live a culture of having sheltered family environment and guided learning conditions, which may have made them get used to not doing immediate appropriate responses during problematic situations. In the context of the MT/MLS profession, the results of this study are consistent with the findings of Valdez (2010) which stated that competencies such as communication, teaching and training responsibility, are not as high as the other competencies demonstrated by the medical technologists because these competencies are mostly developed while one becomes familiar in their daily conduct of professional responsibilities in the hospital.

Grippingly, a related study on employers' perceptions on entry-level staff indicated that employers may not have expectations that schools can bestow upon their students important business and working skills. They believe these skills could only be developed through real 'on the job' experiences. When asked explicitly about perceived deficiencies in entry-level athletic trainers, common responses were most often lack of interpersonal communication, procedural and business skills, which was consistent with similar studies on other professions. (Massie et al., 2009).

Overall, the preparedness to ASCP certification examination of the MT/MLS graduates in Region XI is rated low and interpreted as being average (mean = 80.26), implying that the various competency skills needed for them to succeed in ASCP certification examination is just average. Interestingly, the ratings of the students are widely dispersed as revealed by high standard deviation values ($SD > 1.0$), especially in communication, teaching and training responsibility, and supervision and management, which implies that the sample population is

heterogeneous, that is, the respondents' individual abilities in this specific areas are highly varied, indicating that the respondents are not uniform in terms of their cognitive capacities and learning styles.

With these, the competencies of the MT/MLS graduates should be strengthened and aligned with the competencies emphasized in the international medical technologist (ASCP) examination content guideline if the intention of every MT/MLS schools, especially here in Region XI, is to address the pressing need for highly trained, technically skilled, globally competitive medical technologists who can work in different areas of specialization in the laboratories in the years to come.

Further, in the professional world, critical thinking skills are very important. Graduates must be able to make quick decisions which are based on logic. Internship programs must incorporate teaching students how to excel in a large number of different organizational and industrial settings. Education is not enough to allow graduates to perform at a higher level. In the real world environment, analytical skills are not enough. Students must have both interpersonal and leadership abilities. While most colleges are good at teaching analytical skills, they are lacking when it comes to other characteristics. By effectively using internships, students will increase their skills and make themselves valuable in the job market. Their employers will benefit as well, and they can increase the efficiency of their businesses (Exforsys Incorporated, 2006)

Table 3
The correlations of academic proficiency and internship performance rating to the level of preparedness to ASCP certification exam of the MT/MLS graduates in Region XI

<i>Variables Being Correlated:</i>	<i>Pearson r (r²)</i>	<i>Interpretation</i>	<i>p-value</i>	<i>Decision α= 0.05</i>
Academic Proficiency & Preparedness	.810**(.6561)	High Correlation; marked relationship	.000	Reject Ho, significant
Internship & Preparedness	.663**(.4396)	Moderate Correlation; substantial relationship	.000	Reject Ho, significant

Table 3 shows that there is a significant direct, high correlation between the MT/MLS graduates' academic performance and their level of preparedness to ASCP certification examination ($r = .810$; $p < .05$). This implies that an increase in academic performance of the MT/MLS graduates corresponds to an increase in

their level of preparedness to ASCP certification examination.

As the coefficient of determination ($r^2 = .6561$) indicates 65.61% of the variation in the level of preparedness to ASCP certification examination of the MT/MLS graduates can be attributed to their academic performance mirrored in their WPA and NLE rating. It therefore implies that 34.39% of the variation is caused by other factors not covered by the study. Likewise, there is a significant direct, moderate correlation between the MT/MLS graduates' internship performance rating and their level of preparedness to ASCP certification examination ($r = .663$; $p < .05$, table 3). It implies that the higher the internship performance rating of the MT/MLS graduates, the higher is their level of preparedness to ASCP Certification Examination.

As revealed by the coefficient of determination ($r^2 = .4396$), the internship performance rating explains 43.96% of the variation in the level of preparedness to ASCP certification examination of the MT/MLS graduates. Thus, other factors which affect the level of preparedness of the graduates not covered by the study account at 56.04%. The correlations of both predictors academic proficiency and internship performance rating to the level of preparedness for ASCP certification exam of the MT/MLS graduates in Region XI are both significant and direct, with academic proficiency showing higher correlation (table 3) These results reject the null hypotheses 1 and 2 of the study which states that there is no significant relationship between the academic proficiency and the level of preparedness to ASCP certification examination; and there is no significant relationship between the internship performance rating and the level of preparedness to ASCP certification examination among the MT/MLS graduates in Region XI, respectively.

These results are consistent with the findings of Frith et al. (2015) on their investigation of academic performance in prenursing courses manifested by GPA and scores in standardized tests if NCLEX-RN failure can be predicted by these variables, which revealed GPA as an important predictor of NCLEX-RN failure. Students who do not pass NCLEX-RN on the first attempt exhibit lower GPAs as compared to those who do pass NCLEX-RN. Moreover, students who passed NCLEX-RN had significantly higher scores in the standardized SAT and ACT tests compared to students who failed NCLEX, who had significantly lower scores.

On the other hand, the internship performance rating as a direct predictor to ASCP certification exam is supported by the TEAC's Guide to Accreditation (2012), which states that clinical internships can support a program's claims that its graduates are competent, caring, and qualified. However, the study of Besinque et al. (2000) on Pharmacy Education attested the contrary, indicating that the type of internship, whether hospital or community pharmacy, was not a good predictor of passing the board exam. The California Board of Pharmacy has a minimum

requirement of 1000 internship hours to qualify for the licensure examination. As observed, the CMO No. 14. (2006), governing the policies, standards, and guidelines for medical technology education in the Philippines, requires a minimum clinical internship of 1,080 hours as compared to the minimum of 1000-hour internship requirement of the California Board of Pharmacy.

Table 4
Influence of academic performance and internship performance rating on the level of preparedness to ASCP certification exam of the MT/MLS graduates in Region XI

<i>Predictors</i>	<i>Unstandardized Coefficients β</i>	<i>Standardized Coefficients β</i>	<i>t</i>	<i>p-value</i>
(Constant)	.703		.115	.877
Academic Proficiency	1.031	.860	10.480	.000
Internship	-.070	-.060	-.729	
r	.810			
r ²	.657			
F	166.324			
p-value	.000			

From table 4, it can be seen that between academic proficiency and internship performance as predictors, it is academic proficiency ($\beta = .860$; $p < .05$) that prevailed as the significant factor that influences the level of preparedness of the MT/MLS graduates to ASCP Certification Examination. Specifically, for every unit increase in academic proficiency, there is a corresponding .86 increase in the level of preparedness of the MT/MLS graduates to ASCP Certification examination. On the other hand, the internship performance rating ($\beta = -.060$; $p > .05$) does not establish any significant influence.

Thus as such, the hypothesis 3 of the study which states that there is no significant influence in the academic proficiency of the MT/MLS graduates to the level of preparedness to ASCP certification examination is rejected, while hypothesis 4 which states that there is no significant influence in the Internship performance of the MT/MLS graduates to the level of preparedness to ASCP certification examination is accepted.

As clearly established in the conceptual framework of this study, the academic proficiency encompasses both WPA and NLE Rating (NLER). Hence, it is interesting to zero in between these two specific sub-variables which one indeed has stronger influence to the respondents' preparedness for ASCP certification examination. This is elucidated in the next table.

Table 5
Influence of WPA and NLE rating on the level of preparedness to ASCP certification exam of the MT/MLS graduates in Region XI

<i>Predictors</i>	<i>Unstandardized Coefficients β</i>	<i>Standardized Coefficients β</i>	<i>t</i>	<i>p-value</i>
(Constant)	1.708		.422	.673
Academic Proficiency				
WPA	.136	.126	1.896	.060
NLER	.705	.712	13.502	.000
Internship	.113	.096	1.250	.213
r		.853		
r ²		.728		
F		154.013		

From table 5, it can be clearly seen that among the three predictors namely WPA, NLER and internship, only NLER ($\beta = .712$; $p < .05$) prevailed as a significant factor that influences the level of preparedness of the MT/MLS graduates to ASCP certification examination. Specifically, for every unit increase in NLER, there is a corresponding .86 increase in the level of preparedness of the MT/MLS graduates to ASCP Certification examination. Though the WPA was not shown to have significant influence, it may still affect preparedness to ASCP Certification examination ($p = .06$). Again, as consistent with the results in table 4, the internship performance rating ($\beta = .096$; $p > .05$) do not establish any significant influence to the respondents' preparedness to ASCP Certification examination.

Again, it is interesting that of the two variables (WPA and NLER) under academic proficiency, only NLER was shown to significantly influence ASCP exam preparedness when many related studies have shown the two to be predictors of each other. This could be explained by the fact that in the context of Region XI MT/MLS graduates' preparation for NLE examination, there always would be review program interventions, as was the case for the respondents of this study, as revealed earlier in the methods section. This means that concepts and knowledge learned throughout the respondents' undergraduate years as reflected by their WPAs, could even be more enriched and reinforced by the comprehensive reviews they undergo in preparation for taking the NLE. Hence, NLE could be seen as encompassing the WPA and thus expectedly would significantly influence the respondents' preparedness to ASCP exam.

This is supported by the study on Predicting Pass/Fail Outcomes in Tennessee on the Medical Technologist (ASCP) National Certification Examination by Floyd (2011), which states that it is possible to predict pass/fail outcomes of medical technology graduates based on GPA and the 2+2 curriculum plan. In other words, graduates with GPA's of 2.2 to 4.0 and are enrolled in a 2+2 curriculum plan, are more likely to pass the national certification examination. Likewise, graduates with GPA's below those ranges and are not enrolled in a 2+2 curriculum plan are less likely to pass the national certification examination.

Additionally, the survey study titled *Implementation of a Review Course: A Case For Improved Outcomes*, conducted amongst Weber State University (WSU) MLS students in the US, revealed the importance of implementing review classes to increase the pass rate of the students that take the MLS certification exam, and supported that review classes and practice exams help improve scores and are good predictors of certification pass rates. (Weber State University, 2012).

Hence, the significant influence of NLER to preparedness to ASCP examination could be attributed to a fact that the respondents of this study were preparing and reviewing for the NLE for medical technologist while the ASCP examination was rendered and the data was gathered. In fact, of the 177 MT/MLS graduates who participated in this study, 169 or 95.48% passed the said NLE.

CONCLUSION

In the light of the findings derived from this study, the following conclusions were formulated:

1. The academic proficiency which includes the WPA and the NLER of the graduates has a descriptive rating of low which means that preparedness to ASCP certification examination of the MT/MLS students is in average level only. This could be due to socioeconomic and ethnic backgrounds and difficulties encountered while completing the course, which also become reflected in their low NLE rating. Thus schools deficient in strict retention policy produce graduates with very poor academic performance who are permitted to take NLE and most, if not all, end up with a poor performance rating or even fail the examination.
2. The internship performance rating of the MT/MLS graduates has a descriptive rating of low and can be interpreted that they have average internship performance rating. Factors like differences in clinical internship curriculum, length of internship program and variation in clinical area for training could have contributed to the low internship rating of the graduates.

3. The level of preparedness in terms of competencies to ASCP certification examination of the MT/MLS graduates in Region XI as to knowledge, technical skills, problem and analytical decision making were all low, which may be acceptable because the respondents of this study were recent graduates whose competencies will still be honed further along time. While for communication, teaching and training responsibilities supervision and management, statistical data proved poor performance rating of the students, which again may be permissible because, primarily, these three competencies are the least explored competencies during their training. A very limited clinical exposure of six months could also be a factor why the competencies of the graduates showed low or poor ratings.
4. The increase in academic performance corresponds to an increase in the level of preparedness to ASCP certification examination of the MT/MLS graduates. This high correlation is attributed to the competencies developed by the students during their academic formation and during their preparation to take the NLE.
5. The significant direct, moderate correlation between internship performance rating and the level of preparedness to ASCP certification examination of the MT/MLS graduates could be due to the school's Internship program which could be affected by different strategies utilized to improve students' performance.
6. Between the two sub-variables of academic proficiency, the NLER is the significant factor and WPA is only marginally significant factor that influences the level of preparedness of the MT/MLS graduates to ASCP certification examination, while internship performance rating did not establish any significant influence. The result is acceptable since the respondents were then reviewing for the NLE. Indeed, 171 out of the 177 respondents of the study passed the September 2014 NLE set by PRC. WPA and internship ratings, as a marginal and not a significant factor, respectively, are also acceptable results since both ratings are products of longer set-up imperilling students to interfering factors that might have pulled down their final outputs or ratings.

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