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Competencies of Career-Entry Medical Technology Graduates of Lyceum of Batangas: Basis for Enhancement of the Internship Training Program

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Abstract - The role of medical technologists in the clinical laboratory has changed within the last five years due to changes in the laboratory environment. Substantial modification in the medical technology curriculum is needed to prepare graduates for technologic, regulatory, staffing and operational changes in laboratory medicine. It is the ultimate goal of the College to prepare students for career entry positions as medical technology professionals. The curriculum should be designed to prepare the graduates and demonstrate the core competencies expected of them in the workplace. It is for this reason that this study was conducted to assess the career entry-level competencies expected of the graduates of the College of Medical Technology of Lyceum of Batangas. Findings of the study served as basis in enhancing the curriculum to make it more responsive to the needs

of local and international healthcare systems. Using a descriptive method, the respondents were the chief medical technologists and immediate supervisors of selected hospitals who have as their staff LB Medical Technology graduates under the AHSE curriculum (2002-2006). A total of 77/138 (56%) graduates were evaluated using a structured type of questionnaire following a Likert scale with 5 as the highest and one as the lowest values. The parameters in the questionnaire were derived from the model formulated from the various competency-based standards of various local and international accrediting professional associations.

Keywords - Competency, medical technology, LPU- Batangas

INTRODUCTION

During the past two decades, the health care industry has been undergoing profound transformational events, not only in the Philippines, but also worldwide in other countries. These events were spawned by the multitudes of forces converging to the national as well as international levels, which had impact on the quality of medical technology practice.

The role of medical technologists in the clinical laboratory has changed within five years due to changes in the laboratory environment. Substantial modification in the medical technology curriculum is needed to prepare graduates for technologic, regulatory, staffing and operational changes in laboratory medicine. Curricular reform is necessary to improve the products and services that laboratory educators provide their customers. Reform improves the quality of medical technology education to better respond to customer needs.

Reports revealed that demand for medical technologists had skyrocketed. This places more pressure on educators to make medical technology training flexible and accessible (AMT, 2006).

In the recent tracer study conducted by the College of Medical Technology on the status of their graduates, results 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. Prior to their current jobs, they have undergone "competency-based" certification examinations (Valdez, 2007).

Internationally, the American Medical Technologists (AMT), American Society for Clinical Laboratory Science (ASCLS) and American Society of Clinical Pathologists (ASCP) administer these "competency-based" certification examinations prior to the acceptance of medical technology professionals in medical institutions in the United States. The same practice is being pursued in Australia through the Australian Institute of Medical Scientists (AIMS) and in Canada by the Canadian Society for Medical Laboratory Science (CSMLS). This competency-based testing strategy determines whether or not the examinees possess the skills and knowledge required for successful performance in their particular role.

In the Philippines, licensure examinations are administered by the Professional Regulation Commission prior to the practice of the profession. Medical institutions, through the pathologists and laboratory staff, are subjecting fresh graduates who had passed the licensure examinations to undergo post-internship training of at least six months to test the knowledge and skills of newly passed graduates before they are officially employed by hospital owners and managers.

It is the goal of the Lyceum of Batangas to encourage students to pursue their highest standard of scholarship and help them assume responsibility for developing and achieving their own goals and objectives. Hence, the primary goal of the College is to provide superior undergraduate professional education in the medical technology. The curriculum should assure student-oriented instruction in theory and the techniques of diagnostic laboratory procedures. Affiliate clinical laboratory assignments are a continuum of this area of specialized education and are designed to broaden student's education and practice. Demonstration of the specific professional entry level competencies is thus expected of the students. The curriculum should be designed to prepare the graduates as such. It was for this reason that this study was conducted to assess the career entry-level competencies expected

of the graduates of the College of Medical Technology of Lyceum of Batangas. Findings of the study served as the basis for improving, updating or enhancing the Medical Technology curriculum to make it more responsive to the needs of local and international healthcare systems.

FRAMEWORK

The term "competence" is a semantic label (Cronbach, 1971) that connotes knowledge, skill and acumen. It is assumed to be a general attribute of high-ability professionals. However, we never see competence directly only its indicators. A competent radiologic technologist can immobilize patients before taking films, select cassette sizes for different radiographic examinations and distinguish positive from negative contrast agents. In psychological terms, competence is a multidimensional construct and inferences govern the attribution of competence to a professional (McGaghie,1980).

Identification of the boundaries and content of competence is required to understand the meaning of health profession. Boundaries are needed because every health profession or specialty dwells on a subset of health-care needs. Professional boundaries overlap to some extent, as in the case of occupational therapy and physical therapy. However, competent performance in these areas and other health professions require a unique set of skills, abilities and dispositions. Lack of uniqueness would mean that the profession and specialty are not, in fact, "special."

The same is true with content, broadly defined, that resides within boundaries established by or for a profession. Content is the "stuff" of professional practice, the knowledge and insight, skills and competencies, sentiments and dispositions that constitute the substance of professional work. When a nurse is said to be competent it means that he or she can manipulate, recall or otherwise use relevant content to achieve a desired end (e.g., rehabilitated patient, and administrative coup) or perhaps, conforming with the accepted procedural rules, (e.g., the "nursing process"). The content of any health profession is likely to be both public, i.e., available and evident to external observers, and tacit, i.e., known but inexpressible (Polanyi, 1964).

Competency has been defined as "the ability to perform the activities within an occupation or function to the standard expected in employment" (National Competency Standards Policy and Guidelines, Australian National Training Board, 1998). The term "competency" thus embodies attributes such as knowledge, skills, abilities and attitudes required in professional practice. Competency may be core, general or task-specific. Examples of core competencies are literacy, numeracy, reliability, communication skills and ability to work in teams. General competencies refer to competencies for the particular profession, as in the case of the Medical Technology profession i.e., general competencies of medical technologists or medical laboratory scientists. In contrast, task-specific competencies refer to individual disciplines in the practice of the profession (e.g. hematology, microbiology, etc. for Medical Laboratory Science or Medical Technology profession).

Competency, according to Harris (1995), involves possession and application of knowledge, skills and attitudes to perform work activities according to the expected standard in the workplace. Key elements of a competency include: (1) task skills which require performance of the task or tasks to the required standard as described in the unit of competency and expected at the workplace. The assessor needs to gather evidence that the candidates can do the particular activities as well as the entire task; (2) task management skills – skills used when planning and integrating potentially different tasks in order to achieve the particular work outcome. Candidates for the particular position should provide evidence that they can work efficiently to meet deadlines, handle a sequence of interrelated tasks and progress smoothly between tasks; (3) contingency management tasks – the requirement to respond to irregularities and breakdown of routines. Candidates should show evidence of dealing with contingencies such as breakdowns, irregularities, imperfections, and the unknown; and, (4) job/role environment skills – the requirements of dealing with the responsibilities and expectations of the work environment. Capability to work with others and adapt to varying situations is central to successful performance.

McGaghie (1998) categorized competencies into (1) student competencies such as entry, intermediate, or terminal and (2) professional competencies which are classified as graduate career-entry

also known as entry-level competencies and continuing professional competencies.

Competencies are very important. They encourage learners to integrate related outcomes and perform at higher and more complex levels. Competencies provide the basis for educational programs. They are gained through a multitude of ways namely life experience; formal education; a wide variety of learning experiences (e.g. courses, laboratories, independent research, presentations, and projects); clinical rotations or apprenticeship; on-the-job experience; self-help and training and development programs. All of these constitute to the job competence of employees. Ultimately, supervisors and employees working together and assessing consistency of job performance or "behaviors" over time determine overall "employee competence."

Determining sets of core competencies for medical technologists is vital to the continuation and success of the profession. At a more practical level, core competencies can help medical technologists recruit, hire, train and remain as valuable employees. Many hospitals and universities in the United States use lists of core competencies as basis for formulating interview questions (AMT journal, 2002).

Competence in Medical Technology

Medical technology combines the challenges of medicine with scientific knowledge. Medical technologists also called clinical laboratory scientists perform in the laboratory a wide range of tests that play a vital role in the detection and treatment of diseases and disorders. Laboratory tests can be simple or complex usually requiring the use of microscopes, state-of-the-art instruments and computers.

In a clinical setting, medical technologists perform and/or supervise the performance of analytical testing of blood, body fluids, and other types of biological specimens. They identify the presence of bacteria, fungi or parasites or prepare blood units for purposes of transfusion. Typical areas in the clinical hospital setting are hematology, chemistry, immunology, blood bank, and microbiology. Medical technologists are trained to use skills in critical thinking, problem solving and situational analysis that arise in the clinical laboratory. Using their technical skills and knowledge of disease status, medical technologists are an integral staff for patient diagnosis and treatment.

Careers in medical technology are available in hospital laboratories, forensic laboratories, reference laboratories, molecular diagnostics, veterinary offices, doctor's offices, management, industry, pharmaceutical and cosmetics industries, medical sales, and educational and research institutions.

The most marketable skill of an entry-level medical laboratory technologist is the application of principles learned in the educational program for use in a broad spectrum of laboratory activities in the work environment. Over the past few years there was concern for how well the "syllabus approach" met the needs of programs preparing entry-level medical laboratory technologists for a workplace that is rapidly changing due to new technology in the health care system.

According to Harris et al (1995) competency-based education is structured around competent performance by learners, where competence is defined in terms of achievement of the level of work standards. The quality of education is more readily measured. Since the performance levels are described by standards of consistency of expected performance between programs and schools. This is more easily determined.

Competency-based curriculum refers to an organized set of learning experiences based on knowledge, skills and abilities as demonstrated by the learner derived from expectations explicit in the stated desired mastery levels. The competency-based curriculum dwells on competencies (knowledge, skills, abilities) demonstrated by the learner (1) as derived from industry-identified skill standards; (2) stated so as to make possible assessment of learner behavior in relation to expected levels of mastery under specified conditions; (3) based and in harmony with specified competencies and, (4) made public in advance. Assessment of the student competencies is based on (1) their performance as the primary source of evidence; (2) performance is measured against a competency standard and one that strives for objectivity (Harris et al, 1995).

One of the key aspects in the development of competency standards and in the skills and other attributes believed to be most needed in the work force are critical thinking, problem solving and the ability to use and combine knowledge and skills to address new challenges. Foundation skills such as problem solving and critical thinking have

been taught traditionally in academic classes. Integration of technical content and foundation skills brings more related emphasis on the foundation skills and puts technical content of the context of the solution of work- related problems.

Related Studies

In 1993, the Australian Association of Clinical Biochemists, Australian Institute of Medical Laboratory Scientists and the Australian Society for Microbiology developed competency-based standards for Australian medical scientists. Standards were developed to show the contribution normally expected from an individual with a degree in a relevant area of science from an Australian or equivalent university along with two years of relevant professional experience in an accredited laboratory. This is the entry level of a scientist to the profession that combines qualifications, skills and personal responsibilities and accountability.

About the same year, the Research and Development Committee and the Board of Governors of the ASCP Board Registry initiated a study to identify the professional competencies for the medical laboratory technologist certification examinations. Six general competencies were identified, namely (1) technical skills; (2) judgement and analytical decision making; (3) knowledge base; (4) communication; (5) teaching and training; and supervision and management. Specific responsibilities were identified and validated under the six general competencies (Journal of Laboratory Medicine, 1995).

The Canadian Society for Medical Laboratory Science (CSMLS) for its part in 2000 came up with its revised competency profile for entry-level medical laboratory scientists that focuses on outcomes rather than content to meet the needs of the changing profession. The competency profile describes learning results, a major shift in philosophy which concentrates on knowledge, skills, attitudes and judgement necessary for an entry-level medical technologist to perform successfully in the laboratory.

Educational programs prepare generalists to practice collaboratively in structured laboratory environments and ensure that they will be able to practice safely and effectively in predictable

situations. The CSMLS has identified six competency categories namely: (1) safe work practices; (2) data gathering and specimen procurement or receipt; (3) Analysis of specimen and validation of results; (4) analytical techniques; (5) interpretation and reporting of results; and (6) quality management. Each competency category has its own competency indicators where points or marks are being assigned when used in assessing an entry-level medical laboratory technologist.

METHODOLOGY

The main instrument used in this study was a structured type of questionnaire using Likert scale of 1 to 5. The questionnaire was derived from the model formulated from the various competency-based standards of various accrediting societies and associations like the American Medical Technologists (AMT), National Accrediting Agency for Laboratory Scientists (NAACLS), Australian Institute for Medical Scientists (AIMS); and Canadian Society for Medical Laboratory Science (CSMLS).

Data from the tracer study on medical technology graduates SY 2002-2006 conducted by the same author were used in tracing where they are employed. The respondents were the chief medical technologists or immediate supervisors of the institutions where the graduates are employed since the same are the ones who conduct performance evaluation of the medical technologists.

The study was conducted among Medical Technology graduates SY 2002-2006 of Lyceum of Batangas only where the AHSE curriculum was implemented. The survey was limited to graduates who are working in the hospital-based clinical laboratories. The competency-based standards of foreign Medical Technology associations were used for benchmarking of the model competency standards checklist because there were no standard competencies identified yet neither by the Professional Regulation Commission nor the professional association at that time.

RESULTS AND DISCUSSION

There were a total of seventy-seven out of the 138 (55%) Medical Technology graduates of SY 2002-2006 were evaluated by their immediate supervisors in five different hospitals where the graduates are employed. Majority (73%) of those whose competencies were evaluated by their immediate supervisors were graduates of batch 2002 followed by 60% (15/25) from batch 2003 and 56% (13/23) from batch 2004, 48% (15/31) from SY 2005-2006 and 12/29 (41%) graduates of SY 2004-2005. Table 1.

Understandably, there were more respondents from batch 2002 to 2004 because there were many graduates who had taken and passed the licensure examinations for medical technologists and therefore were hired to work in the different clinical laboratories. There were few graduates who were evaluated from batch 2004 and 2006 because there were very few who took the licensure examinations and therefore only those who were registered professionals were employed in different hospitals in the region and few hospitals in the National Capital Region. About 10% (13/138) of the medical technology graduates opted to continue to pursue their medical degree course while 5/138 (3%) got married and did not take the licensure examinations nor worked in the hospital anymore.

Table 1. Distribution of respondents per year graduated (n=138)

Year graduated	No. of Graduates	No. of Respondents	Frequency (%)
2002	30	22	73
2003	25	15	60
2004	23	13	56
2005	29	12	41
2006	31	15	48
TOTAL	138	77	100%

Of the total 77 medical technology graduates who were evaluated, 87% (67/77) passed the medical technology licensure examinations and 10 (13%) failed. The ten graduates who failed were working as clinical laboratory technicians in the different hospitals.

Table 3 shows the distribution of the graduates as to length of service in the practice of their profession.

Length of service	No. of Respondents	Frequency (5)
Less than 1 year	18	23
1 year	21	27
2 years	19	25
3 years	12	16
4 years	7	9
TOTAL	77	100%

Twenty to thirty percent (20/77) of the graduates had been in the practice of the profession from less than a year to two years and these were graduates from 2004 to 2006 because it took them a year or two in the preparation for the licensure examinations and the externship training of about two to six months before they can be permanently hired in the hospitals. The remaining 10% to 15% were those who graduated in 2002 and 2003 and naturally they had been practicing for quite sometime to compare to those who recently had graduated.

Table 4 shows the model standard competencies derived from the benchmarking study done by the same author and was used in crafting the survey questionnaire for identification of core competencies of medical technology graduates SY 2002-2006.

Table 4. Model Standard Competencies

CATEGORY: PROFESSIONAL RESPONSIBILITY
Indicators:

- Meets the legal and ethical requirements of practice.
- Projects a professional image and follows generally accepted practices regarding interactions with patients/clients and colleagues.
- Values her/his position in the health care team and exhibits empathy and understanding in the care of the patient.
- Respects patient's right to a reasonable standard of care by maintaining patient confidentiality at all times.

CATEGORY: PROFESSIONAL LABORATORY SKILLS AND SAFE WORK PRACTICES
Indicators:

- Conducts professional practice according to established protocols, safety guidelines, and hospital guidelines.
- Demonstrates proficiency in the specimen collection & handling.
- Applies the principles of clinical laboratory methodology by performing simple and complex procedures with precision and accuracy.
- Verifies relevant data and ensures that appropriate specimen are collected according to established protocols.
- Analyzes specimen and validates results using established protocols.
- Understands the principles and performs analytical techniques on specimen that originate from variety of sources.
- Demonstrate the ability to organize and perform multiple procedures routine and non-routine situations.
- Interprets, communicates and documents confidential data using scientific knowledge as the basis.
- Applies the principles of disease prevention and control to health promotion in their role as partners in the delivery of public health services.
- Practices and promotes quality management system and the efficient utilization of resources.

CATEGORY: CRITICIAL THINKING, PROBLEM SOLVING & DECISION MAKING

Indictors:

- Demonstrates ability to solve problems and make decisions in the management of his/her own workload, the workload of the team and in interactions with patients/clients and other members of the health care team.
- Evaluates and solves problems related to collection and processing of biological specimen for analysis.
- Differentiates and resolves technical, instrument, physiological causes of problems or unexpected test results.

CATEGORY: COMMUNICATION, TEAMWORK & INTERACTIVE SKILLS

Indicators:

- Interacts with patients/clients and laboratory colleagues in a professional and competent manner using effective listening, verbal and non-verbal and written communication.
- Interacts with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
- Exhibits care and compassion in direct and indirect contact with patients.

CATEGORY: INSTRUMENTATION AND COMPUTER SKILLS

Indicators:

- Demonstrates proficiency in the mathematical computation of laboratory methodology.
- Applies the principles of clinical laboratory instrumentation, including performance and preventive maintenance.
- Uses computer skills to manage efficiently using available software packages and LIMS (laboratory information management systems).

CATEGORY: LEADERSHIP AND MANAGEMENT
Indicators:

- Exercises leadership when placed in an environment or situation which requires it.
- Applies the basic principles of management to ensure the efficient and effective delivery of laboratory information in the provision of quality health care.
- Gives direction and guidance to technical support personnel.
- CATEGORY: TRAINING RESPONSIBILITIES
- Indicators:
- Provides instruction in theory, technical skills safety protocols and application of laboratory test procedures.
- Supports and seeks continuing professional education.

Table 5 shows which among the core competencies were highly exhibited by the medical technology graduates of Lyceum of Batangas in the practice of their profession.

Table 5. Professional competencies of medical technology graduates of Lyceum of Batangas

CATEGORIES	VALUE	RANK
1. Professional Responsibility	4.628	2nd
2. Professional Laboratory Skills and Safe Work Practices	4.732	1st
3. Critical Thinking, Problem Solving and Decision Making	4.000	7th
4. Communication, Teamwork and Interactive Skills	4.347	4th
5. Instrumentation and Computer Skills	4.300	5th
6. Leadership and Management	4.384	3rd
7. Teaching and Training Responsibilities	4.069	6th

From the seven categories of core competencies described in the model, competencies on professional laboratory skills and safe work practices showed to be the most demonstrated and practiced by the graduates with a mean value of 4.732 verbally interpreted as "ALWAYS" demonstrated. These competencies can be demonstrated as being able to meet the legal and ethical requirements of practice; projects a professional image and follows generally accepted practices regarding interactions with patients/clients and colleagues; values her/his position in the health care team and exhibits empathy and understanding in the care of the patient; respects patient's right to a reasonable standard of care by maintaining patient confidentiality at all times.

This was followed by competencies showing the conduct of professional responsibility with a weighted mean of 4.628 ("ALWAYS") as indicated by: meets the legal and ethical requirements of practice; projects a professional image and follows generally accepted practices regarding interactions with patients/clients and colleagues; values her/his position in the health care team; exhibits empathy and understanding in the care of the patient, and respects patient's right to a reasonable standard of care by maintaining patient confidentiality at all times.

The third category of competencies that graduates always demonstrate in the practice of their profession is on leadership and management with a weighted mean of 4.384. These top three categories of competencies are the most demonstrated by medical technology graduates probably because of the orientation they have been exposed to during their internship training that in the actual practice of their profession they have to be professionally responsible at all times as any legal mistakes in the conduct of their profession will expose themselves to a lot of legal issues that might revoke their license and more importantly will affect the health and lives of the patients.

The next three categories of competencies are also always demonstrated by the graduates however their weighted mean varies and are not as high as the top three categories (from 4.000 to 4.036) because these competencies are mostly developed while one becomes familiar in their daily conduct of professional responsibilities in the hospital. The length of stay in their place of work hones the knowledge,

skills, attitudes and belief of the professionals while taking into consideration the organizational culture, policies and guidelines in the respective hospitals where they work.

The length of service working as medical technologists in the respective hospitals where they work was also correlated with the competencies being demonstrated by the graduates. Results showed that there is significant correlation as to the length of service and the demonstration of the competencies by the graduates on the following categories of competencies: competencies on communication, teamwork and interactive skills ($p=0.620$); and competencies on teaching and training responsibilities ($p=0.711$). Meaning these competencies can be more developed as one stays in the practice of his/her profession. Honing the skills and attitudes in these categories of competencies also takes time.

CONCLUSIONS

The results presented in this study have shown that majority of the medical technology graduates of Lyceum of Batangas SY 2002-2006 have always demonstrated the competencies expected of them like professional responsibility and professional laboratory skills and safe work practices while further improvement and retooling is needed on the following competencies like critical thinking, problem solving and decision-making; communication, teamwork and interactive skills, instrumentation and computer skills; leadership and management and teaching and training responsibilities. With these results, there is a need to help the future graduates to develop to the fullest these entry-level competencies by enhancing the Medical Technology internship training program using an evaluation instrument based on the competency-based standards model giving emphasis on constant mentoring, implementation, constant evaluation and monitoring of the program and the students as well.

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