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Christenson, Karen L. *An Assessment of Clinical Affiliate's Expectations Regarding Medical Laboratory Technician Student Readiness at Western Technical College*

Abstract

The field of laboratory medicine has experienced several challenges including serving the healthcare needs of an aging population, program closures and a workforce shortage. These challenges have impacted the field of laboratory medicine and the ability of hospitals to serve their patients while also training students. Ensuring students have the clinical skills expected of the clinical sites will lessen the burden on those sites. The purpose of this study was to identify the competencies that Western Technical College clinical affiliates expect in the Medical Laboratory Technician students they accept for clinical rotations. Descriptive research methodology was employed to gather input from the population. A survey was used to gather the data required to address and answer the research questions. The study affirmed that the quality of students attending clinical from Western Technical College are in very close alignment to what is expected in a beginning laboratory employee. The study identified opportunities for improvement in all three competency areas assessed – technical skill, theoretical knowledge, and attitudinal characteristics. Targeting program improvement efforts in these areas, especially the area of theoretical knowledge, should help to lessen the training burden on clinical sites.

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I would like to thank my advisor, Carol Mooney, for her patience and motivation throughout this process. Little did she know when she took me on as an advisee that she would become a cheerleader and therapist as well as a mentor. I would not have been able to finish this work without her. To my family, I thank you for your support as I took the time away from you to complete this project. You are my everything.

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Chapter I: Introduction

A medical laboratory technician (MLT) is a health care professional who works in a hospital or clinic, and less frequently in public health agencies, pharmaceutical firms, or research institutions. Laboratory technicians collect blood specimens, culture and stain bacteria, make microscopic and chemical examinations of urine, blood and other body fluid and cross match blood. The role of a medical laboratory technician is an important part of the detection, diagnosis and treatment of many diseases. A MLT is expected to handle stressful conditions and to supply critical information for the patients' care.

Educational training for medical laboratory technicians is a 2-year associate degree program. The graduates of the program need to function as entry level medical laboratory technicians. In order to achieve this, students must obtain theory and the hands-on skills needed to function in this capacity. Through lecture, student laboratory, and clinical rotation, students are provided the skill development to be successful. Students attend lectures, practice their skills in student laboratories, and get real-world experience at various clinical rotations. A typical laboratory and clinical experience consists of 4-8 weeks at a rural hospital lab and 12-16 weeks at an urban hospital lab. This extensive clinical practicum is crucial to the training of competent medical laboratory technicians. Although student laboratories attempt to simulate a clinical setting it cannot compare to the experience gained at an actual hospital or clinic. Students learn how to multitask and to respond to the variations in workload. They learn communications skills and how to function as part of a team.

The clinical affiliates are necessary partners with educational institutions in training clinical laboratory technician students. The experience gained at a clinical site during the students' clinical experience cannot be adequately simulated in a classroom setting. However,

requesting that students be placed at hospitals for extended rotations is a burden on resources. According to the American Hospital Association (2009), the involvement of trainees in patient care reduces the overall efficiency of hospital operations. Additionally, healthcare is not recession proof. The Bureau of U.S. Labor and Statistics (2010) reported that more hospitals recorded mass layoffs in 2008 than in any year in the past decade. With the economic downturn, any and all expenditures are being investigated – including the expense of training students.

An additional challenge is that the field of laboratory medicine is experiencing a shortage of well-trained and qualified laboratory personnel. Data from the American Society of Clinical Pathology's 2008 Wage and Vacancy Survey indicates that 43% of clinical labs reported difficulty hiring personnel. Therefore, there are less people available to train students. However, a more recent survey indicates that the anticipated retirements of baby boomers has not yet happened due to changes in the labor market (Garcia, Ali, & Choudhry, 2013). Laboratorians may be remaining in their jobs longer due to uncertainties in the economy. Employment of medical laboratory workers is expected to grow by 15 percent between 2010 and 2020, about as fast as the average for all occupations (Bureau of Labor and Statistics, 2013). The volume of laboratory tests continues to increase with both population growth, an aging population, and the development of new types of tests (Bureau of Labor and Statistics, 2013). Compounding the problem is that the numbers of professionals needed are higher than the number of students graduating from MLT and Medical Laboratory Science programs (Beck & Doig, 2005). Over the past two decades there has been decreased interest in the career of laboratory medicine. This has led to the closure of programs that train technicians/technologists (Garcia et al., 2011).

With the workforce shortage and program closings, those training programs that continue need to operate in both cost-effective and non-traditional manners (St. John & Kanuth, 2006).

But incorporating new concepts into a curriculum can be challenging at a time of limited resources (Moon & Legrys, 2008). Some educational programs have investigated other avenues and modes of educating students (Simonian, 2007). One institution formed a partnership between a pharmaceutical company and a university clinical laboratory science program (Kasper & Shultze, 2006). In the field of nursing education, an institution developed an innovative clinical experience to build confidence and competence in technical skills and patient learning (Wagner, Bear, & Sander, 2009). Faculty facilitated a simulated laboratory to practice maternal self-care teaching and infant care skills prior to beginning their rotation in this department. This aided in skill transfer.

While simulated clinical experiences are valuable, it is difficult to replicate the experience gained in a real lab. Therefore the clinical sites are valuable yet they are facing their own challenges such as budget cuts and hiring freezes. Requesting that they train students during these challenging times is a struggle. Yet the clinical sites are aware that they will need these workers in the near future. In order to try to ease this burden it is important to investigate what level of preparedness the clinical sites expect of students to ensure that the affiliate will continue to partner with the educational institution.

Statement of the Problem

The field of laboratory medicine is experiencing several challenges including serving the healthcare needs of an aging population, program closures and a workforce shortage. These challenges impact the field of laboratory medicine and the ability of hospitals to serve their patients while also training students. Ensuring students have the clinical skills expected of the clinical sites will lessen the burden on those sites. The purpose of this study was to identify the

competencies that Western Technical College clinical affiliates expect in the Medical Laboratory Technician students they accept for clinical rotations.

Research Questions

Following are the research questions this study attempted to answer. They are;

1. What technical skills do clinical affiliates expect of a beginning MLT?

2. Is there a gap in the technical skills that students possess compared to what is expected?

3. What level of theoretical knowledge do clinical affiliates expect of a beginning MLT?

4. Is there a gap in the theoretical knowledge that current students possess compared to what is expected?

5. What attitudinal characteristics are expected of beginning MLT?

6. Is there a gap in the attitudinal characteristics that current students possess compared to what is expected?

Assumptions of the Study

The assumptions the researcher brings to this study are:

- The researcher assumes the clinical affiliates are willing participants in the study.

- The researcher assumes the clinical affiliates will answer the survey questions truthfully and honestly.

Definition of Terms

There are six terms that need to be defined for clarity of understanding. They are:

Attitudinal characteristics. The ability of MLT students to exhibit professional conduct, ethical conduct, commitment to the patient, and communication skills within the healthcare team.

Clinical affiliate. A hospital or clinic laboratory that offers clinical experiences to Western Technical College's Medical Laboratory Technician students.

Clinical laboratory. A laboratory that analyzes patient samples. The results of the analysis directly affect the care of the patient (Mosby's Medical Dictionary, 2008).

Competencies. "The minimum requirements in knowledge and skills to function effectively in the occupation" (National Accrediting Agency for Clinical Laboratory Sciences, 2006).

Level of knowledge. The ability of MLT students to understand the methodologies for all major areas in a modern clinical laboratory. This includes the ability to understand the use of lab results in diagnosis and treatment.

Technical skills. The ability of MLT students to collect, process, and perform routine clinical laboratory tests.

Limitations of the Study

In any study performed, quality information is desired. The following are limits the researcher can foresee:

- Clinical affiliates range in size from small clinic laboratories to large hospital laboratories. Differences in responses based on affiliate size were not analyzed in the study. However, a diverse sample may make the data more generalizable.

- The survey was developed by the researcher specifically for this study and was not tested for validity or reliability. However, every effort was made to develop a valid and reliable survey instrument.

- The study was limited to clinical affiliates identified by Western Technical College's Medical Laboratory Technician program. The data cannot be assumed to be applicable to areas outside of the area surveyed.

- The study gathered data regarding Western's MLT program. The results may not apply to other programs that have the same or similar clinical sites.

Chapter II: Literature Review

An aging population, medical laboratory training program closures, and a shortage of qualified laboratory personnel are severely impacting the field of laboratory medicine. These challenges affect the ability of hospitals to serve their patients while also training laboratory students. This chapter will discuss the workforce shortage and how aging, the economy, and program closures have impacted this shortage. In addition, the effect of the aging population's healthcare needs will be discussed. The chapter will conclude with a review of the importance of partnerships between schools and clinical sites.

Shortage of Laboratory Technicians

There are three factors affecting the current shortage of qualified laboratory personnel. These include the aging workforce, the economy, and the closure of academic programs that train laboratorians. In 2008, data from the American Society of Clinical Pathology's Wage and Vacancy Survey indicated that 43% of clinical labs reported difficulty hiring personnel. The current vacancy rates are well below this peak, however, low rates do not mean that there aren't jobs. Because hospitals are such large employers in the state, low rates still result in many available positions (Wisconsin Hospital Association, 2012). Nationally, employment of medical laboratory workers is expected to grow by 15 percent between 2010 and 2020, about as fast as the average for all occupations (Bureau of Labor and Statistics, 2013). In Wisconsin, the estimated vacancies in medical laboratory technicians are 139 positions (Department of Health Services, 2012).

The anticipated retirements of baby boomers has not yet happened due to changes in the labor market (Garcia, Ali, & Choudhry, 2013). The recession has eased staffing shortages in the short term by delaying retirements. Older workers have returned to work or are remaining in

their jobs longer. However, eventually the economy will recover and older workers will retire (Wisconsin Hospital Association, 2012). In a 2012 survey, 36 percent of medical technologists were at least 55 years old (Wisconsin Hospital Association, 2012). Baby boomers will eventually age out of the workforce and this will leave gaps that Wisconsin's current projected population and the educational system in which they develop skills cannot meet (Sullivan, 2012).

Compounding the issue is that the numbers of professionals needed are higher than the number of students graduating from Medical Laboratory Technician and Medical Laboratory Science programs (Beck & Doig, 2005). In fact, from 1983-2008, the number of National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) accredited programs decreased over 65%; this resulted in approximately 50% fewer graduates (NAACLS, 2009). Over the past two decades there has been a decreased interest in the career of laboratory medicine. This is one factor that has led to the closure of programs that train technicians/technologists (Garcia et al., 2011). Another reason that programs close is that it is a high cost per student program. The high cost of equipment, reagents, test kits and supplies needed make laboratory training programs expensive programs to run. The trifecta of an aging workforce, the economy, and program closures are all contributing to the current and impending workforce shortage.

Healthcare Demands of an Aging Population

The older population is growing rapidly, and the aging of the "Baby Boomers" born between 1946 and 1964 (and who began turning age 65 in 2011), are accelerating this growth.

In 2010, there were 40 million people age 65 and over in the United States, accounting for 13 percent of the total population. The older population in 2030 is projected to be twice as large as in 2000, growing from 35 million to 72 million and representing nearly

20 percent of the total U.S. population. (Federal Interagency Forum on Aging Related

Statistics, 2012, p. 2)

Wisconsin is also feeling the effects of an aging population. In fact, "between 2010-2014, the

number of senior residents in Wisconsin will nearly double" (Sullivan, 2012). The aging

population will increase the demand for healthcare (Wisconsin Hospital Association, 2012) as

older age is often accompanied by increased risk of certain diseases and disorders. This will also

lead to a higher lab test volume (Garcia et al., 2011) to diagnose and monitor the chronic health

conditions often reported in this population. Chronic diseases are long-term illnesses such as

hypertension and arthritis that are rarely cured. The increased need for care and services will

only aggravate the shortage of qualified laboratory personnel.

Educational Partnerships with Medical Institutions

It is important that employers and education programs work together to address the

current and impending shortage of well-trained, qualified laboratory personnel. Program

accrediting agencies often require that students have access to clinical learning experiences.

However, the involvement of trainees in patient care reduces the overall efficiency of hospital

operations (American Hospital Association, 2009). Hospitals report seeing an increase in request

for student learning opportunities and these requests are being examined much more closely

(Wisconsin Hospital Association, 2012). Additionally, healthcare is not recession proof. The

Bureau of U.S. Labor and Statistics (2010) reports that more hospitals recorded mass layoffs in

2008 than in any year in the past decade. Staffing shortages have made it difficult to incorporate

the training of students into the daily workload (NAACLS, 2009).

Chapter III: Methodology

The field of laboratory medicine is experiencing several challenges that impact the ability of hospitals to serve their patients while also training students. Ensuring students have the clinical skills expected of the clinical sites will lessen the burden of training students on those sites. The purpose of this study was to identify the competencies that Western Technical College clinical affiliates expect in new MLT employees and compare this to what students possess. This chapter will include information about how the study sample was selected, a description of the sample, and the instruments used. In addition, data collection and data analysis procedures will be given. The chapter will conclude with the methodological limitations.

Subject Selection and Description

This study surveyed the clinical sites utilized by Western Technical College's Medical Laboratory Technician program. These clinical sites are located within Western Technical College's district boundaries. The district is located in the west central area of Wisconsin. The clinical sites are located in both urban and rural settings as well as include both hospital and clinic laboratories. The clinical sites range in size from smaller institutions that employ 1-2 generalists to larger facilities that have 30+ laboratory technicians – both department specialists as well as generalists.

A cluster method of subject sampling was utilized. All of the clinical contacts from Western Technical College's MLT program's clinical affiliates received a survey. Thus, the cluster sample consisted of clinical contacts used by Western Technical College's MLT program. Potentially the results from the study will be able to be generalized to other Wisconsin Technical College Districts.

Instrumentation

Descriptive research methodology was employed to gather input from the population representing clinical affiliates that provide clinical experiences for Western Technical College's Medical Laboratory Technician students. A survey was used to gather the data required to address and answer the research questions. Due to the uniqueness and specificity of the study, the original survey instrument was constructed by the researcher. Literature was reviewed to develop an effective survey. The survey instrument utilized a list of competencies needed to perform as a Medical Laboratory Technician. The competency list was developed from Western Technical Colleges' MLT program outcomes and the Wisconsin Technical College System's statewide curriculum program outcomes. These outcomes were developed by technical college faculty that serve MLT programs in the state of Wisconsin. Additionally, these competencies were drawn from the National Accrediting Agency for Clinical Laboratory Sciences curriculum requirements and target standards. The survey utilized a Likert scale to obtain information regarding clinical sites' opinions on student technical skills, theoretical knowledge and attitudinal characteristics. Additionally, the survey inquired as to expectations of beginning MLT employees to obtain benchmark data. Before the survey was administered to the sample, it was reviewed with a subject expert to enhance content validity. The survey questions were then downloaded into an electronic survey tool, Qualtrics. Qualtrics is a system supported by the University of Wisconsin-Stout and is recognized as a professional, trustworthy electronic survey tool.

Data Collection Procedures

All of the clinical affiliates of Western Technical College's MLT program received an email from the researcher informing them of the survey and requesting their participation, as

well as informed consent. The survey instrument was administered electronically via a link to the survey in the email. The clinical affiliates were given ten days for completion of the survey. The responses were then gathered from the survey software and analyzed.

A reminder email was sent to all contacts after five days asking them to complete the survey if they had not already done so.

Data Analysis

A number of statistical analyses were use in this study. The researcher consulted with Susan Greene from UW-Stout's Office of Planning, Assessment, Research & Quality for assistance in running the data analysis. The researcher was provided with a data analysis report to aid in interpretation.

The data obtained from the survey was coded, tabulated and analyzed using quantitative data analysis. Descriptive statistical techniques, such as frequency distribution, mean, median and standard deviation were used to analyze the survey responses. The Statistical Program for Social Sciences version 10.0 (SPSS, 2002) was used to analyze the data.

Limitations

The survey was developed by the researcher specifically for this study and was not tested for validity or reliability. However, every effort was made to develop a valid and reliable survey instrument. Available research was reviewed for the elements of an effective survey and a content expert examined the survey to increase validity.

Summary

An aging population, medical laboratory training program closures, and a shortage of qualified laboratory personnel are severely impacting the field of laboratory medicine. These challenges affect the ability of hospitals to serve their patients while also training laboratory

students. Ensuring students have the clinical skills expected of the clinical sites will lessen the burden on those sites. It is important to identify the competencies that Western Technical College clinical affiliates expect in the Medical Laboratory Technician students they accept for clinical rotations. This study attempted to do that by surveying all of the clinical affiliates of Western Technical College's MLT program.

Chapter IV: Results

The purpose of this study was to identify the competencies that Western Technical College clinical affiliates expect in the MLT students they accept for clinical rotations compared to the expectation for new MLT's. The clinical sites utilized by Western Technical College's Medical Laboratory Technician program were surveyed to assess their expectations. This chapter presents the results of that survey.

Demographics

This study surveyed the clinical sites utilized by Western Technical College's Medical Laboratory Technician program. These clinical sites are located within Western Technical College's district boundaries. A cluster method of subject sampling was utilized. All of the twenty six clinical contacts from Western Technical College's MLT program's clinical affiliates received a survey. Eighteen individuals responded to the survey. Of these, 7 were laboratory managers, 6 were laboratory supervisors, 2 were medical laboratory technologists, 2 were medical laboratory technicians, and one did not answer. Nine respondents were from clinics and nine were from hospitals. The clinic sizes ranged from 2 providers to 70 providers. The hospital sizes ranged from 25 beds or less (7 respondents) to 40 beds (1 respondent), and 350 beds (1 respondent). The mean number of years that respondents have been coordinating/supervising MLT student clinicals is 11.53 with a standard deviation of 8.647. The mean length of time that respondents have worked with Western Technical College's MLT program is 13.47 with a standard deviation of 8.3. When asked if they hire Western Technical College MLT program graduates, 88.9% of respondents indicated yes.

Item Analysis

What technical skills do clinical affiliates expect of a beginning MLT? There were

five competencies surveyed that assessed the technical skills expected of beginning Laboratory

Technician employees. They are: collect and process biological specimens, demonstrate proper

laboratory technique while performing analytical tests, record pertinent data derived from

laboratory testing electronically or manually, practice laboratory safety and regulatory

compliance, and perform preventative and corrective maintenance of equipment and instruments

or refer to appropriate source for repairs.

Competency 1: – Collect and process biological specimens – 22.2% of the respondents

indicated sometimes, 50.0% indicated most of the time, and 27.8% indicated always. The mean

was 4.06 with a standard deviation of .725. Refer to table 1 for a graphic representation of

results.

Competency 2: - Demonstrate proper laboratory technique while performing analytical

tests – 5.6% of the respondents indicated sometimes, 38.9% indicated most of the time, and

55.6% indicated always. The mean was 4.50 with a standard deviation of .618. Refer to table 1

for a graphic representation of results.

Competency 3: - Record pertinent data derived from laboratory testing electronically or

manually – 5.9% of the respondents indicated never, 11.8% indicated rarely, 23.5% indicated

sometimes, 17.6% indicated most of the time, and 41.2% indicated always. The mean was 3.76

with a standard deviation of 1.300. One respondent did not provide an answer to this question.

Refer to table 1 for a graphic representation of results.

Competency 4: - Practice laboratory safety and regulatory compliance - 100% of the responses were always. The mean was 5.00 with a standard deviation of .000. Refer to table 1 for a graphic representation of results.

Competency 5: - Perform preventative and corrective maintenance of equipment and instruments or refer to appropriate source for repairs – 5.6% of the respondents indicated never, 16.7% indicated rarely, 38.9% indicated sometimes, 27.8% indicated most of the time, and 11.1% indicated always. The mean was 3.22 with a standard deviation of 1.060. Refer to table 1 for a graphic representation of results.

Table 1

How Often Do You Expect Beginning Laboratory Technician Employees to Exhibit the

Following Competencies

Competency	Response	Frequency	Percent	Mean	Std. Deviation
Collect and process biological specimens	Sometimes	4	22.2	4.06	.725
	Most of the Time	9	50		
	Always	5	27.8		
	Total	18	100		
Demonstrate proper laboratory technique while performing analytical tests	Sometimes	1	5.6	4.50	.618
	Most of the Time	7	38.9		
	Always	10	55.6		
	Total	18	100		
Record pertinent data derived from laboratory testing electronically or manually	Never	1	5.6	3.76	1.6
	Rarely	2	11.1		
	Sometimes	4	22.2		
	Most of the Time	3	16.7		
	Always	7	38.9		
	Total	17	94.4		
	No answer	1	5.6		
	Total	18	100		
Practice laboratory safety and regulatory compliance	Always	18	100	5.00	.000
Perform preventative and corrective maintenance of equipment and instruments or refer to appropriate source for repairs	Never	1	5.6	3.22	1.060
	Rarely	3	16.7		
	Sometimes	7	38.9		
	Most of the Time	5	27.8		
	Always	2	11.1		
	Total	18	100		

Is there a gap in the technical skills that students possess compared to what is expected? One out of the five competencies assessing technical skills had a statistically significant gap (<.05) in what students possess compared to what is expected. This was found in competency 2: – Demonstrate proper laboratory technique while performing analytical tests. The paired samples test, 2-tailed significance was .008. When asked about the expectation of employees, the mean was 4.53 with a standard deviation of .624 and for beginning MLT students, the mean was 3.94 with a standard deviation of .827.

What level of theoretical knowledge do clinical affiliates expect of a beginning MLT? There were five competencies surveyed that assessed the theoretical knowledge expected of beginning Laboratory Technician employees. They are: correlate laboratory results to diagnosis of clinical conditions and/or diseases, utilize data to calculate numerical results of laboratory tests whenever applicable, categorize factors that affect procedures and results, assess problems and take appropriate actions within predetermined limits when corrections are indicated, and monitor and evaluate quality control.

Competency 1: - Correlate laboratory results to diagnosis of clinical conditions and/or diseases – 11.1% of the respondents indicated rarely, 44.4% indicated sometimes, 22.2% indicated most of the time, and 22.2% indicated always. The mean was 3.56 with a standard deviation of .984. Refer to table 2 for a graphic representation of results.

Competency 2: - Utilize data to calculate numerical results of laboratory tests whenever applicable – 17.6% of the respondents indicated rarely, 29.4% indicated sometimes, 23.5% indicated most of the time, and 29.4% indicated always. The mean was 3.65 with a standard deviation of 1.115. One respondent did not provide an answer to this question. Refer to table 2 for a graphic representation of results.

Competency 3: - Categorize factors that affect procedures and results – 16.7% of the respondents indicated rarely, 11.1% indicated sometimes, 50.0% indicated most of the time, and 22.2% indicated always. The mean was 3.78 with a standard deviation of 1.003. Refer to table 2 for a graphic representation of results.

Competency 4: - Assess problems and take appropriate actions within predetermined limits when corrections are indicated – 27.8% of the respondents indicated sometimes, 38.9% indicated most of the time, and 33.3% indicated always. The mean was 4.06 with a standard deviation of .802. Refer to table 2 for a graphic representation of results.

Competency 5: - Monitor and evaluate quality control – 27.8% of the respondents indicated sometimes, 22.2% indicated most of the time, and 50.0% indicated always. The mean was 4.22 with a standard deviation of .878. Refer to table 2 for a graphic representation of results.

Table 2

How Often Do You Expect Beginning Laboratory Technician Employees to Exhibit the

Following Competencies

Competency	Response	Frequency	Percent	Mean	Std. Deviation
Correlate laboratory results to diagnosis of clinical conditions and/or diseases	Rarely	2	11.1	3.56	.984
	Sometimes	8	44.4		
	Most of the Time	4	22.2		
	Always	4	22.2		
	Total	18	100		
Utilize data to calculate numerical results of laboratory tests whenever applicable	Rarely	3	16.7	3.65	1.115
	Sometimes	5	27.8		
	Most of the Time	4	22.2		
	Always	5	27.8		
	Total	17	94.4		
	No answer	1	5.6		
	Total	18	100		
Categorize factors that affect procedures and results	Rarely	3	16.7	3.78	1.003
	Sometimes	2	11.1		
	Most of the Time	9	50		
	Always	4	22.2		
	Total	18	100		
Assess problems and take appropriate actions within predetermined limits when corrections are indicated	Sometimes	5	27.8	4.06	.802
	Most of the Time	7	38.9		
	Always	6	33.3		
	Total	18	100		
Monitor and evaluate quality control	Sometimes	5	27.8	4.22	.878
	Most of the Time	4	22.2		
	Always	9	50		
	Total	18	100		

Is there a gap in the theoretical knowledge that current student possess compared to what is expected? Four out of the five competencies assessing theoretical knowledge had a statistically significant gap (<.05) in what students possess compared to what is expected.

Competency 1: – Correlate laboratory results to diagnosis of clinical conditions and/or diseases. The paired samples test, 2-tailed significance was .015. When asked about the expectation of employees, the mean was 3.56 with a standard deviation of .984 and for beginning MLT students, the mean was 3.06 with a standard deviation of .725.

Competency 3: - Categorize factors that affect procedures and results. The paired samples test, 2-tailed significance was .005. When asked about the expectation of employees, the mean was 3.78 with a standard deviation of 1.003 and for beginning MLT students, the mean was 3.06 with a standard deviation of .938.

Competency 4: - Assess problems and take appropriate actions within predetermined limits when corrections are indicated. The paired samples test, 2-tailed significance was .000. When asked about the expectation of employees, the mean was 4.06 with a standard deviation of .802 and for beginning MLT students, the mean was 3.06 with a standard deviation of .639.

Competency 5: - Monitor and evaluate quality control. The paired samples test, 2-tailed significance was .000. When asked about the expectation of employees, the mean was 4.22 with a standard deviation of .878 and for beginning MLT students, the mean was 3.44 with a standard deviation of .856.

What attitudinal characteristics are expected of a beginning MLT? There were five competencies surveyed that assessed the attitudinal characteristics expected of beginning Laboratory Technician employees. They are: maintain established institutional standards including patient confidentiality, recognize the need for flexibility and adapt to changes in the

healthcare setting, communicate with colleagues and patients in a professional manner, collaborate with other healthcare personnel to enhance patient care, and model professional behaviors, ethics, and appearance.

Competency 1: Maintain established institutional standards including patient confidentiality – 100.0% of the respondents indicated always. The mean was 5.00 with a standard deviation of .000. Refer to table 3 for a graphic representation of results.

Competency 2: Recognize the need for flexibility and adapt to changes in the healthcare setting – 27.8% of the respondents indicated most of the time and 72.2% indicated always. The mean was 4.72 with a standard deviation of .461. Refer to table 3 for a graphic representation of results.

Competency 3: Communicate with colleagues and patients in a professional manner - 100.0% of the respondents indicated always. The mean was 5.00 with a standard deviation of .000. Refer to table 3 for a graphic representation of results.

Competency 4: Collaborate with other healthcare personnel to enhance patient care – 5.6% of the respondents indicated rarely, 22.2% indicated sometimes, and 72.2% indicated always. The mean was 4.39 with a standard deviation of 1.037. Refer to table 3 for a graphic representation of results.

Competency 5: Model professional behaviors, ethics, and appearance - 100.0% of the respondents indicated always. The mean was 5.00 with a standard deviation of .000. Refer to table 3 for a graphic representation of results.

Table 3

How Often Do You Expect Beginning Laboratory Technician Employees to Exhibit the

Following Competencies

Competency	Response	Frequency	Percent	Mean	Std. Deviation
Maintain established institutional standards including patient confidentiality	Always	18	100.0	5.00	.461
Recognize the need for flexibility and adapt to changes in the healthcare setting	Most of the Time	5	27.8	4.72	.461
	Always	13	72.2		
	Total	18	100.0		
Communicate with colleagues and patients in a professional manner	Always	18	100.0	5.00	.000
Collaborate with other healthcare personnel to enhance patient care	Rarely	1	5.6	4.39	1.037
	Sometimes	4	22.2		
	Always	13	72.2		
	Total	18	100.0		
Model professional behaviors, ethics, and appearance	Always	18	100.0	5.00	.000

Is there a gap in the attitudinal characteristics that current students possess

compared to what is expected? Three out of the five competencies assessing attitudinal

characteristics had a statistically significant gap (<.05) in what students possess compared to

what is expected.

Competency 2: – Recognize the need for flexibility and adapt to changes in the healthcare

setting. The paired samples test, 2-tailed significance was .011. When asked about the

expectation of employees, the mean was 4.72 with a standard deviation of .461 and for beginning

MLT students, the mean was 4.00 with a standard deviation of .907.

Competency 3: Communicate with colleagues and patients in a professional manner.

The paired samples test, 2-tailed significance was .007. When asked about the expectation of

employees, the mean was 5.00 with a standard deviation of .000 and for beginning MLT

students, the mean was 4.39 with a standard deviation of .850.

Competency 5: Model professional behaviors, ethics, and appearance. The paired

samples test, 2-tailed significance was .000. When asked about the expectation of employees,

the mean was 5.00 with a standard deviation of .000 and for beginning MLT students, the mean

was 4.56 with a standard deviation of .511.

Chapter V: Summary and Conclusions

An aging population, medical laboratory training program closures, and a shortage of qualified laboratory personnel are severely impacting the field of laboratory medicine. These challenges affect the ability of hospitals to serve their patients while also training laboratory students. Ensuring students have the clinical skills expected of the clinical sites will lessen the burden of training students on those sites. The purpose of this study was to identify the competencies that Western Technical College clinical affiliates expect in the MLT students they accept for clinical rotations. This chapter will summarize the results of the study and offer conclusions.

Discussion

The findings of this study are presented using each of the research questions as an introduction and will be summarized and discussed below.

Findings by Research Questions

What technical skills do clinical affiliates expect of a beginning MLT? The study examined five competencies assessing technical skills necessary for the beginning MLT to possess. They were: collect and process biological specimens, demonstrate proper laboratory technique while performing analytical tests, record pertinent data derived from laboratory testing electronically or manually, practice laboratory safety and regulatory compliance, and perform preventative and corrective maintenance of equipment and instruments or refer to appropriate source for repairs.

Competency 1: – Collect and process biological specimens. Close to 80% of the respondents indicated most of the time and always being necessary for the beginning MLT to

perform. Therefore, it is necessary that the students have the ability to collect and process specimens.

Competency 2: - Demonstrate proper laboratory technique while performing analytical tests. Close to 95% of the respondents indicated most of the time and always being necessary for the beginning MLT to demonstrate. Therefore students need to be able to properly perform testing as well.

Competency 3: - Record pertinent data derived from laboratory testing electronically or manually. Close to 60% of the respondents indicated most of the time and always as being necessary for the MLT to possess. With a lower percentage in this competency, it is not as crucial for students to record data. This is probably due to the variety of data recording methods at various sites.

Competency 4: - Practice laboratory safety and regulatory compliance.   100% of the responses were always necessary for the beginning MLT to follow. Therefore, it is always necessary for students to follow regulatory compliance and safety as well.

Competency 5: - Perform preventative and corrective maintenance of equipment and instruments or refer to appropriate source for repairs. Close to 40% of the respondents indicated most of the time and always being necessary for the beginning MLT to perform. As with competency 3, this lower percentage indicates that it is not as important for students to perform corrective maintenance. Again, this is most likely due to the variety of instruments at the clinical sites.

Is there a gap in the technical skills that students possess compared to what is expected? The data from competency 2 – demonstrate proper lab technique while performing analytical tests - indicated that there was a statistically significant gap in what students possess

when compared to what is expected of beginning employees. This indicates that this is an area for improvement in the quality of student preparedness for clinical. Efforts could be targeted in this area to improve the students and therefore lessen the training burden on the clinical sites.

What level of theoretical knowledge do clinical affiliates expect of a beginning MLT? There were five competencies surveyed that assessed the theoretical knowledge expected of a beginning Medical Laboratory Technician. They are: correlate laboratory results to diagnosis of clinical conditions and/or diseases, utilize data to calculate numerical results of laboratory tests whenever applicable, categorize factors that affect procedures and results, assess problems and take appropriate actions within predetermined limits when corrections are indicated, and monitor and evaluate quality control.

Competency 1: - Correlate laboratory results to diagnosis of clinical conditions and/or diseases. Close to 45% of the respondents indicated most of the time and always being necessary for a beginning MLT. The lower percentage here indicates that it is not as crucial a competency as some of the others. The correlation of laboratory results is perhaps not as commonly done in routine laboratory work. It is necessary, however, for the successful passing of the board of certification exam.

Competency 2: - Utilize data to calculate numerical results of laboratory tests whenever applicable. Close to 55% of respondents indicated most of the time and always being necessary for a beginning MLT. Most of the instrumentation now performs these calculations for the laboratorian. Perhaps this is why the percentage is lower for this competency.

Competency 3: - Categorize factors that affect procedures and results. Close to 75% of respondents indicated most of the time and always being necessary for a beginning MLT. The

higher percentage in this competency indicates that it is also important for students to be knowledgeable about factors that affect procedures and results.

Competency 4: - Assess problems and take appropriate actions within predetermined limits when corrections are indicated. Close to 75% of respondents indicated most of the time and always being necessary for a beginning MLT. Therefore, students need to be able to examine problems and take corrective action.

Competency 5: - Monitor and evaluate quality control. Close to 75% of respondents indicated most of the time and always being necessary for a beginning MLT. Again, the high percentage indicates that this is a competency that students need to be able to perform.

Is there a gap in the theoretical knowledge that current students possess compared to what is expected? Four out of the five competencies assessing theoretical knowledge had a statistically significant gap ($<.05$) in what students possess compared to what is expected. These competencies were:

Competency 1: – Correlate laboratory results to diagnosis of clinical conditions and/or diseases.

Competency 3: - Categorize factors that affect procedures and results.

Competency 4: - Assess problems and take appropriate actions within predetermined limits when corrections are indicated.

Competency 5: - Monitor and evaluate quality control.

A gap was identified in competency 1, however, this is a competency with a relatively low percentage (45%) of being necessary to most of the time or always perform. Therefore, more focus on improvement efforts should be spent on competencies 3, 4, and 5 as these had a percentage of 75%.

What attitudinal characteristics are expected of beginning MLT students? There were five competencies surveyed that assessed the attitudinal characteristics expected of beginning Laboratory Technicians. They are: maintain established institutional standards including patient confidentiality, recognize the need for flexibility and adapt to changes in the healthcare setting, communicate with colleagues and patients in a professional manner, collaborate with other healthcare personnel to enhance patient care, and model professional behaviors, ethics, and appearance.

Competency 1: Maintain established institutional standards including patient confidentiality – 100.0% of the respondents indicated always being necessary for a beginning MLT. Therefore, it is necessary for students to follow institutional standards.

Competency 2: Recognize the need for flexibility and adapt to changes in the healthcare setting – 100% of the respondents indicated most of the time and always being necessary for a beginning MLT. It is also necessary for MLT students to demonstrate this competency as well.

Competency 3: Communicate with colleagues and patients in a professional manner - 100.0% of the respondents indicated always being necessary for a beginning MLT. Therefore, it is necessary for students to exhibit professional communication as well.

Competency 4: Collaborate with other healthcare personnel to enhance patient care – nearly 95% of the respondents indicated sometimes and always. Due to the high percentage, students need to also demonstrate this competency.

Competency 5: Model professional behaviors, ethics, and appearance - 100.0% of the respondents indicated always being necessary for a beginning MLT. Therefore, students need to model professionalism as well.

Is there a gap in the attitudinal characteristics that current students possess compared to what is expected? Three out of the five competencies assessing attitudinal characteristics had a statistically significant gap in what students possess compared to what is expected. The competencies were:

Competency 2: – Recognize the need for flexibility and adapt to changes in the healthcare setting.

Competency 3: Communicate with colleagues and patients in a professional manner.

Competency 5: Model professional behaviors, ethics, and appearance.

Because of the high percentage rating as to importance in all three of these competencies, it is important that this area be a focus for targeted improvement efforts.

Conclusion

The study affirmed that the quality of students attending clinical from Western Technical College are in very close alignment to what is expected in a beginning laboratory employee. However, the study did identify opportunities for improvement in all three competency areas assessed – technical skill, theoretical knowledge, and attitudinal characteristics. In the areas that showed gaps, there are opportunities to seek more alignment between what is expected of beginning employees and what the students possess. Specific program course competencies should be examined to discover where the specific gap competencies are located as the program outcomes are directly tied to courses. Then program faculty can examine current practice to discover where modifications can be made to enhance performance in the identified areas of weakness. Targeting program improvement efforts in these areas, especially the area of theoretical knowledge, should help to lessen the training burden on clinical sites.

Recommendations

It is recommended that the results of the study be shared with the MLT program faculty at Western Technical College. Additionally, the results should be reviewed at a MLT program advisory committee meeting to generate further discussion on improvement areas. An area of suggested future research would be to replicate this study and re-survey the clinical affiliates with more questions targeted at the specific gap areas. This would provide further details as what the clinical facilities would like to see in the clinical students.

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