An Analysis of Employer's Satisfaction with the Radiologic Technology Program Graduates at Lakeshore Technical College

by

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ABSTRACT

There is limited current data available that evaluates how well prepared the students graduating from Lakeshore Technical College (LTC) Radiologic Technology programs are. Are the students graduating from this program competent to enter an entry level job as a radiographer? Are LTC graduates successfully prepared to compete in today's workforce? The study was to evaluate the effectiveness of the Lakeshore Technical College Radiologic Technology program. In this study the employers of LTC graduates, in the Wisconsin area, were surveyed. The researcher asked the employers if these students were adequately prepared to work effectively as entry level radiographers in today's workforce. Different characteristics of a competent entry level radiographer were explored. The employers gave the researcher feedback as to how competitive LTC students were to other similar programs graduating students in the same discipline. The

program's strengths and weaknesses were identified. The data was collected between June and October, 2006. The results provided were used as a valuable mechanism to improve this radiologic technology program. This study gave information to identify if LTC's program was meeting the standards spelled out by the accrediting agency, JRCERT.

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Introduction

Background of the Problem

Technology plays an ever increasingly significant role in today's society. It affects everyone's everyday existence by the way travel, business, communication and consumer services are conducted. For example, it is not uncommon for a fuel efficient car, equipped with a GPS system, to be driven down the road by someone conducting business on a cell phone. The ability to understand, utilize, and manage technology effectively on both professional and personal levels is becoming even more important.

Technology continues to change, not only in the business world, but in the healthcare industry as well. For example, new trends being put into practice are picture archiving and communication systems, PACS. PACS are a vital component of the future in medical infrastructures (LeBlanc, 2004). Healthcare workers practice changes as new technological advances occur. At a basic level, PACS is the filmless radiology of the future (LeBlanc, 2004). Service-orientated fields, as in the healthcare fields, demand that their staff stay current in their own specialties (Donnett & Kowalczyk, 1996; The Royal College of Radiologists, 1999). The need for workers with technology skills has become increasingly important. By staying current, this provides the means for a competitive edge in the workforce where clients have multiple choices in who provides their services.

There are concerns about the shortage of competent, skilled workers to fill jobs needing technological know-how. Going one step further, this shortage is also faced in the healthcare workforce (Ho, 2004). Governor Jim Doyle addressed these issues in an annual report from the

Wisconsin Department of Workforce Development. The Governor shared several trends contributing to this shortage:

1) Increasing need of healthcare workers needed for the aging baby boomers.
2) Inadequate replacement supply of retiring workforce workers.
3) Too few instructors teaching students looking for education in high demand healthcare occupations.
4) Lack of clinical sites needed to provide students with learning opportunities to gain Competency in chosen healthcare fields (WI Department of Workforce Development, 2005).

The annual report also provided specific needs in the radiologic technology field. This field is expected to grow 27.7% through 2012 (WDWD, 2005).

As the world becomes advanced through technology, one's teaching and activities must also advance to meet the needs of the students and the public (Sanders, 1999). Employers in the healthcare industry face the challenges of assuring the public that their staff providing services are proficient and competent in various skills. Their staff should also be providing service in a professional manner (Donnett & Kowalczyk, 1996).

"Teachers must tap their imagination and creative talent to translate abstract and complex technological concepts into meaningful learning activities that can be implemented with limited resources" (Welty, 1993, p. 2). Teachers need to provide curriculum that foster these technological concepts. These learning activities should be the focus of evaluation, analysis, and research (Brophy & Alleman, 1990).

Lakeshore Technical College (LTC), located in Cleveland, Wisconsin, has been in existence since 1970 (J. Odau, personal communication, January 30, 2006). The college offers

29 associate degrees, twenty-two technical diplomas, 29 certificate programs, and 12 apprenticeship programs (J. Odau, personal communication, January 30, 2006; LTC, 2006). One of the degreed programs offered, the School of Radiologic Technology, started in 1990. This LTC program is unique; the program works in cooperation with other technical colleges and clinical sites. Classes are interactive, live TV classes sent from LTC to 9 clinical sites or technical colleges. Laboratory classes and clinical experience at various sites are used to help facilitate the learning experience. LTC has 24 clinical sites in many communities across the state of Wisconsin (J. Odau, personal communication, January 30, 2006; LTC Radiography Program Student Handbook, 2004).

The School of Radiologic Technology is a two-year program. The program prepares the students to safely use x rays to create body images for diagnostic purposes, using a professional attitude (Adler & Carleton, 2003). After the successful completion of this program, the graduates are able to take an entry-level certification exam given by the American Registry of Radiologic Technologist (American Society of Radiologic Technologists, 2002). Graduate radiographers found employment in diagnostics imaging center, clinics, and hospitals (LTC, 2004).

The graduate competencies of the LTC School of Radiologic Technology are:

- provide patient care and comfort
- apply knowledge of physiology, anatomy, positioning and radiographic techniques to accurately demonstrate anatomical structures on an image receptor or a radiograph
- apply safe principles of radiation protection for the patient and one's self and others
- determine proper exposure factors to produce optimum radiographic techniques using minimal radiographic exposure to the patient

- evaluate radiographic images for appropriate image quality and positioning
- recognize emergency patient conditions and initiate basic life support procedures and lifesaving first aid
- safely operate diagnostic radiographic equipment
- exercise good critical thinking and problem solving skills
- participate in quality assurance programs in radiography. (LTC, 2004)

Lakeshore Technical College School of Radiology mission statement stated that it is designed to deliver state of the art radiography courses to meet the needs of Wisconsin's communities for qualified radiographers. The graduates of the radiographer's program should function as competent, proficient health care professionals. The radiographers should display concern for technical competency and quality patient care. They will also utilize continuing education as a means of maintaining those skills consistent with new technology (LTC Radiography Program Student Handbook, 2004).

Graduates of the LTC radiologic technology program are evaluated yearly. James Odau (personal communication, January 30, 2006), the program director, stated that there was limited current data available from employers of LTC graduates evaluating the program.

Evaluation continues to be an integral part of running a successful program in any discipline. The term evaluation refers to studies implemented to examine the strengths and weaknesses of policies, programs, organizations, and could be used to improve their effectiveness (American Evaluation Association, 1995). Evaluation asks, is it good enough and if not why not? The purposes of evaluation of any program are part of an evolving process by its own profession and revisited on a regular basis (American Evaluation Association, 2004).

The Joint Review Committee on Education in Radiologic Technology (JRCERT) has the job to accredit education programs in radiography. They are recognized by the United States Department of Education. The JRCERT will award accreditation to programs that demonstrate compliance with these standards. JRCERT expects that radiographic programs have developed a method of planning and evaluation demonstrating program effectiveness in relation to student achievement (JRCERT, 2001). The goals of these standards are to protect students, the public, and promote program improvement. Standard One says that one of the ways that programs can identify its effectiveness is to measure employers' satisfaction. The program should analyze this data for continuous improvement of the program (JRCERT, 2001).

Statement of the Problem

There is limited current data available that evaluates how well prepared the students graduating from Lakeshore Technical College (LTC) Radiologic Technology programs are. Are the students graduating from this program competent to enter an entry level job as a radiographer? Are LTC graduates successfully prepared to compete in today's workforce?

Purpose of the Study

The purpose of the study was to evaluate the effectiveness of the Lakeshore Technical College Radiologic Technology program. In this study the employers of LTC graduates, in the Wisconsin area, were surveyed. The researcher asked the employers if these students were adequately prepared to work effectively as entry level radiographers in today's workforce. Different characteristics of a competent entry level radiographer were explored. The employers gave the researcher feedback as to how competitive LTC students were to other similar programs graduating students in the same discipline. The program's strengths and weaknesses were identified. The data was collected between June and October, 2006. The results provided were

used as a valuable mechanism to improve this radiologic technology program. This study gave information to identify if LTC's program was meeting the standards spelled out by the accrediting agency, JRCERT.

Research Questions

There are 5 research questions this study will attempt to answer. These are:

1) How well are the radiographers program graduates meeting the needs of business and industry?
2) What are the radiographer graduates' job entry level skills, behaviors, and knowledge expected by business and industry?
3) Is there any difference in entry level skills, behaviors, and knowledge expected by industry compared to what they are receiving?
4) To what extent can the radiographer graduates from LTC successfully compete against other graduates of similar programs?
5) Are the graduates able to perform competently with new technologies in your department?

Importance of the Study

The following information outlines the importance of this study. These are:

1) The study provided significant data showing how well the students are prepared to enter the workforce. Educators have the responsibility to the students to help them be successful in the workforce. It is important that we provide a quality education, and provide them with the tools and skills needed to be a competent radiographer.
2) Educators also have a responsibility to the employers hiring these graduates. LTC

has a commitment to the healthcare facilities that employ our students that a quality education was provided to adequately prepare the students to perform their jobs competently. LTC's mission is to support and provide the community with the skilled workers needed (LTC Radiography Program Student Handbook, 2004).

3) According to Brown (2002), evaluating an effective program is an ever evolving process. Part of the ongoing educational process is to continually evaluate, analyze, and implement improvements to the program to fulfill this commitment. It is important that the program be aligned with the standards provided by JRCERT, the accrediting agency.
4) This study of LTC's program may be important to other radiographer programs. The study could provide other programs with data, tools, and methods they could use in their own programs.
5) The need for further research in a given area may be identified in this study. New methods of instruction could be needed and be researched before implementation. New technologies may have to be looked into that are not currently being taught. Before they are taught, background information will need to be investigated.

Limitations of the study

These are the limitations that were identified in this study. They are:

1) A weakness of the study was that the researcher could not control how the employer responded. Sometimes bias can come into the equation. The employers could be biased against or for the LTC program. This could weaken the objectivity of the study.

2) There could be a flaw in the methodology used. The study's method used was a survey. The survey used could have validity issues. A low return rate of surveys could be problematic. The sample return rate may affect the validity of this study.
3) Identifying the sample might have been a limitation. The sample surveyed were the employers of LTC graduates. Being able to identify and locate these employers could have been an issue. The employers may have not remembered LTC graduates employed at a particular site. Locating where the graduates have been employed could limit who was surveyed. The survey was sent only to employers within Wisconsin.
4) The study could either not be valid or unreliable. The population sampled, the sampling method used, biases present, all affect the reliability and validity of the study. The researcher had limited control over these variables.
5) Time could have been a limiting factor. The data collection was done within a month's time. If more or less time would have been used, it could have changed the data collected.
6) The knowledge of the researcher could have been a limitation. The researcher's knowledge of research methods, background information, data collection, data analysis, and sticking to a timeline could all affect the results of the study.

Definition of the Terms

The following terms are explained to give the reader a better understanding of the subject matter in this study:

American Registry of Radiologic Technologists (ARRT) encourages the study and upholds the standards of radiologic technology examining and certifying of eligible candidates (Adler & Carleton, 2003).

Diagnostic radiographic equipment – technical equipment that produces x rays used to produce images of anatomy for diagnostic purposes (Adler & Carleton, 2003).

Exposure factors – selection of the proper exposure factors set by the radiographer for each individual exam necessary to produce a quality diagnostic image (Adler & Carleton, 2003).

Image quality – image possessing proper quality and deemed diagnostic and should show all desired information with a range of acceptance (Adler & Carleton, 2003).

Image receptor – equipment that captures the image produced by x rays (Adler & Carleton, 2003).

Joint Review Committee on Education in Radiologic Technology (JRCERT) - is a governing body of the organization and its members made recommendations on the accreditation status of radiologic technology schools (Adler & Carleton, 2003).

Picture archiving and communication system (PACS) - is a combination of hardware and software that digitally stores information. PACs can interface with others systems to access radiographic images and other patient medical records (Kodak Learning Center, n.d.).

Radiation protection – practices used to minimize the quantity of radiation exposure (Adler & Carleton, 2003).

Radiograph – a radiographic film displaying a body image (Adler & Carleton, 2003).

Radiographer – general term applied to an individual who performs making records of internal structures of the body by the passage of x rays through the body to a film or image system (Adler & Carleton, 2003).

Radiographic technique – same as exposure factors (Adler & Carleton, 2003).

Radiologic technology – the science of making records of internal structure of the body by the passage x rays through the body to the image receptor or film (Adler & Carleton, 2003).

Standards – document specifying the requirements for accreditation of an educational program by a joint review committee (Adler & Carleton, 2003).

Chapter Two

Review of Literature

Introduction

This chapter will include a discussion of new technologies in radiology, followed by the standards on which the program is based. In addition, there will be talk about why evaluation is an important part of any successful program. The chapter will conclude with a study that was done that parallels this study and the results that were found.

Technology

Over the past decade medical imaging has moved towards digital imaging. Computered radiography (CR) is one of the newest ways of acquiring, processing, and displaying digital images. The delivery of images is similar between CR and conventional film/screen systems. The main difference is that CR processes optical signals based on the technology of photo stimulated luminescence. Photo stimulated luminescence means that the imaging plate contains phosphors, that when exposed to x rays, a signal is trapped by the plate. The plate is read by scanning it with a laser light beam. Film/screen systems work on the concept, when the screens are exposed by x rays, light is emitted from the screens to expose the film (Pongnapang, 2005).

Some of the advantages of CR systems are its post-processing capability and its portability. Productivity can be improved by the use of properly used digital imaging. CR systems can require an increase radiation dosage to the patient for diagnostic images. Since these images can be manipulated, as long as the patient has been properly positioned, the technical factors can be changed. This could keep the patient from being reexposed for a repeat radiograph.

Another advantage to using CR is the fact that the phosphor plates are reusable. These plates are subject to normal wear and tear (Pongnapang, 2005).

Digital imaging can be an asset to any radiology department if the staff is properly trained to use the CR system. A quality assurance program is essential for this technology to be successful.

Picture archiving and communication system, PACS, is another technology that radiology departments are utilizing. PACS is a component for radiology departments and medical infrastructures. Basically PACS is a "film less radiology"; it's an electronic storage system for medical records.

PACS can run millions of dollars which include training, work stations, servers, and software. Experts say that a PACS can successfully replace a film system and within 18 months of implementation there will be a return on this investment for medium to larger institutions.

One of the advantages of using PACS systems is that it replaces films which, over time, age and discolor, and the quality of the image decreases. PACS also solves the problem of limited film storage areas. Lost films can be eliminated by using PACS.

One of PACS' largest benefits is to deliver faster, better, and more efficient healthcare. Currently the healthcare system requires 12 people and 60 workflow steps for one chest x ray. Doing this process digitally could streamline this process, be less hassle, and be far more accurate with less chance of errors (LeBlanc, 2004).

The success of implementing new technology in any department depends on how this technology is presented to the people who will be using it. Change upsets employees' understanding of their basic jobs. Involvement of the employees who are using this new technology in decision making about how to implement this system produces the best results.

Educating everyone on how the system works and how new jobs would be performed is a vital part of implementing any new technology. Explaining how the new technology works and how it can be an asset to their department is another key component to success of implementation. Providing training and ongoing support of the technology to all users is important (Bramson, 2004).

Program Standards

Radiologic Technology programs are driven by what the industry calls standards. These standards are provided by the Joint Review Committee on Education in Radiologic Technology (JRCERT). These standards are used for program assessment. These standards are:

- demonstrate that the program has adequate staff
- demonstrate the program has financial resources
- demonstrate the identifies the program's purpose
- program has physical resources
- the program's resources are effectively organized to accomplish its purpose
- provide assurance the program will continue to meet accreditation standards (JRCERT, 2001).

The JRCERT expects programs to provide a system for planning and evaluation. This system should show the program's effectiveness in relation to student achievement. The program is expected to document student learning outcomes while striving for academic excellence.

This assessment should lead to improvement of their program. Different assessment approaches in the evaluation process strengthens the program's competence to document its

effectiveness. JRCERT does not proclaim a specific approach to the program's assessment. The assessment is to gather information to see if the program is able to accomplish its purpose. This helps the program officials develop plans for its continual improvement.

JRCERT is the agency that is responsible for accrediting radiologic technology programs. JRCERT gives the programs "Standards" to guide them. The JRCERT uses these standards as a benchmark and expects the programs to follow them. The programs must follow these standards for accreditation. There are several goals of these standards:

- protect the public
- protect students
- provide academic excellence
- provide measures for financial aid
- stimulate program improvement (JRCERT, 2001).

Standard One states that the radiographic programs support their mission and goals. The program needs a system of evaluation in place. The evaluation process should show the program's effectiveness. The results of this evaluation process should be used for program improvement. The objectives of Standard One are:

- the mission statement states the program's purpose
- the goals state what the program achievements are
- the mission and goal are readily available
- develops and implements an assessment plan
- the assessment plan identifies benchmarks for measurement of outcomes
- these outcomes are consistent with the goals and mission statement
- the measurement of outcomes include:

- employer satisfaction
- communication skills
- critical thinking and problem solving skills
- graduate satisfaction
- program completion rate
- clinical competence
- professional growth and development

- get feedback from communities of interest
- average credentialing exam pass rate of no less than 75% over past five years
- job placement rate of no less than 75% within six months of graduation
- feedback from communities of interest on improvement of policies and procedures and educational offerings
- evaluate and make quality revisions on goals, mission statement and assessment plan (JRCERT, 2001).

At the start of the accreditation process, a self study is filled out by the program and submitted to JRCERT. During the accreditation process the programs are visited by trained people from the JRCERT. They look at documentation, and talk to students and program faculty. JRCERT visits the clinical sites. By doing all the above things, JRCERT looks to see that the "Standards" are being followed by the programs. If there are infractions, these are identified and the program is given a time frame in which to make improvements. If the visiting team sees the standards are not being followed, the program could be put on probation; it depends how serious the infractions are. If improvements are not made, probation is a possibility and accreditation can be taken away. If the program loses it's accreditation, they have to

reapply, do a self study, and provide JRCERT with all the documentation that shows the program is following all the standards needed for accreditation. A site visit is scheduled for the program that is reapplying as part of the accreditation process (JRCERT, 2001).

It is important to graduate from an accredited program. Most schools highly value having the accreditation status. Radiographic programs work hard to maintain standards provided by JRCERT to meet all the accreditation recommendations. Some of the documents required by the programs are the programs' purpose, resources, and it's effectiveness of its outcomes. All these factors assure the students that the program is providing a quality education. It also shows the students that the program chooses to be accountable to an agency that monitors their everyday operating procedures (Adler & Carleton, 2003).

The ultimate goal of these programs is that their graduates pass the certification test and that they are competitive in the workforce. This professional certification recognizes graduates of their needed skills for becoming an entry level radiographer. Nearly all hospitals, clinics, and imaging centers require appropriate certification for employment. The physicians working with these technologists insist on their technologists be certified. Part of the certification process is continuing education. If the technologists wish to keep up their certification status, they must provide documentation of continuing education. It keeps the technologists current on trends in their field (Adler & Carleton, 2003).

Evaluation

The standards state that the program must have an evaluation process in place. Evaluation is an ongoing process of planning, implementing, monitoring, and improving. Evaluative choices are made every day and a lot of these decisions are based on common sense.

Program evaluation is a systematic process that an organization goes through. In this process, information is obtained on its activities, its impacts, and its effectiveness. All this is done to improve its activities and show its accomplishments.

There are benefits to doing an evaluation. Through program evaluation:

- find out what works and what does not
- talk directly to clients of the program about what their likes and dislikes are
- documentation of the clients needs
- identify if program goals and outcomes are being met
- identify unanticipated impacts of the program (Mattessich, 2003).

Evaluation helps correct problems and helps programs build on their successes. This ongoing process serves as a tool, which needs to be clearly defined what is to be accomplished. The phases of program evaluation are:

- design
- data collection
- analysis
- reporting (Matttessich, 2003)

Similar Study

During the research process for this paper, a study very similar to the intent of this study was identified. The study was conducted by administrators and supervisors of radiology departments. They were asked what characteristics they looked for in new employees hired. The two criteria that most administrators thought of were having good interpersonal skills and good knowledge of technical skills needed to do their jobs (Akroyd & Wold, 1996).

Administrators believed they could broaden a new employee's knowledge base of technical skills. They did not think they could as easily boost the new employee's interpersonal skills. Interpersonal skills development depends on long-term training, instincts, and personality adjustments (Akroyd & Wold, 1996).

Customer service was one of the most important concepts to remember, customers, patients pay the paychecks. If the patients are not satisfied with the services they are receiving, they will take their business elsewhere. Employees with good customer service skills are valuable to the workplace (Akroyd & Wold, 1996).

The American Healthcare Radiology Administrator (AHRA) and the Association of Educators in Radiology Sciences (AERS) conducted a survey in 1991. They surveyed radiology administrators asking about the most important characteristics needed in new graduate radiographers. The survey revealed that the most important skills needed were interpersonal communication skills, customer service skills, and technical knowledge needed for the job (Adler & Carleton, 2003).

In another survey done in 1996 by Akroyd and Wold, AHRA members were surveyed. The administrators' perceptions of workplace skills that radiographer graduates needed to perform their jobs were asked. The skills that were identified as needing improvement were: patient-care skills, critical thinking and problem solving skills, and customer satisfaction skills.

These administrators felt that radiographers and radiographer students should concentrate on accomplishing the following:

- meet and exceed physician and patient expectations
- service using a smile
- remember that customers are always right

- develop customer complaint handling skills
- remember paychecks are paid by physicians and patients (Adler & Carleton, 2003)

Chapter Three

Methodology

Introduction

The purpose of the study was to evaluate the effectiveness of the Lakeshore Technical College Radiologic Technology program. In this study the employers of LTC graduates, in the Wisconsin area, were surveyed. The researcher asked the employers if these students were adequately prepared to work effectively as entry level radiographers in today's workforce. Different characteristics of a competent entry level radiographer were explored. The employers gave the researcher feedback as to how competitive LTC students were to other similar programs graduating students in the same discipline. The program's strengths and weaknesses were identified. The data was collected between June and October, 2006. The results provided were used as a valuable mechanism to improve this radiologic technology program. This study gave information to identify if LTC's program was meeting the standards spelled out by the accrediting agency, JRCERT.

Research Design

This study is a descriptive research design. The purpose of this study is to describe characteristics, skills and attitudes of a given population. The data in this study does not seek relationships, cause and effect or to make predictions. The study is a descriptive look at employer's perceptions of job performance of entry-level graduate radiographers under their employment.

Subject Selection and Description

The population used in this study were employers of LTC graduate radiographers. These employers were employed at hospitals, medical centers and clinics in the Wisconsin area.

Names of employers, who had employed LTC graduate radiographers, were obtained from James Odau, the program director of LTC School of Radiologic Technology. Twenty-five employers were randomly selected from this list. The survey was sent to the managers or supervisors of the imaging departments from the selected places of employment. If the subjects filled out the survey they were giving their permission to participate in the study.

Instrumentation

An anonymous survey was used to collect data for the use in the research portion of this study. A survey used by LTC was obtained (J. Odau, personal communication, March 1, 2006). The survey was changed to answer the research questions of this study. Important points from a previously done survey that were discussed in the literature review, was taken into consideration. This survey searched employers for their level of satisfaction of employment of LTC graduate radiographers based on the graduates skills and attitudes. The subjects were also asked if they would hire another LTC graduate entry-level radiographer based on their past experiences with LTC graduates. The survey used is found in the appendix.

Data Collection

The researcher had received Institutional Review Board for the Protection of Human Subjects approval from U W Stout to conduct the research needed for this study. The researcher has also been given approval from the research department at LTC to do this study involving the School of Radiologic Technology. Barbara Dodge, the dean at LTC who oversees this program, has asked the researcher to notify the employers used in this study, that the survey was generated for the purpose of this study and not from LTC. The results of the survey will be shared with Barbara Dodge. The surveys were mailed to the employers in the fall of 2006. Upon

completion of the survey, the employer returned the survey in the self addressed stamped envelope provided. The employers were given three weeks to complete the survey.

Data Analysis

The research questions required little in the way of statistical analysis. All appropriate descriptive stats were conducted on the data. The data from each of the survey questions were analyzed. The five research questions asked in this study were tied in with the data of the survey. The data was analyzed to answer the research questions.

Limitations

There were several limitations to this study. The mailed survey may not have gotten to the intended person targeted for this study. The employer may not have remembered the LTC graduates or any of their skills or traits asked on the survey. The employers may not have identified with the importance of the study and decide not to participate in the study. Time was also a limitation of the survey.

Summary

Chapter three has described how the subjects of this study were selected. How the instrument, the survey, was developed and the method used to collect the data was described. The data analysis of this study was talked about. Any limitations of the instrument, the method, and on sampling were discussed.

Chapter Four

Analysis of Data

In chapter four, the research questions sought through this descriptive research study will be presented. The data acquired through the survey will also be presented. The results of the study will be shown through the use of narrative and tables.

The purpose of the study was to evaluate the effectiveness of the Lakeshore Technical College Radiologic Technology program. In this study the employers of LTC graduates, in the Wisconsin area, were surveyed. The researcher asked the employers if these students were adequately prepared to work effectively as entry level radiographers in today's workforce. Different characteristics of a competent entry level radiographer were explored. The employers gave the researcher feedback as to how competitive LTC students were to other similar programs graduating students in the same discipline. The program's strengths and weaknesses were identified. The data was collected between June and October, 2006. The results provided were used as a valuable mechanism to improve this radiologic technology program. This study gave information to identify if LTC's program was meeting the standards spelled out by the accrediting agency, JRCERT.

Using the Likert scale, the subjects were given four choices to choose from relating to their level of job satisfaction. The Likert scale used was a four point scale, #4 equaling an excellent rating, #3 good rating, #2 fair rating and #1 a poor rating. No measures of reliability and validity were conducted on this instrument because this survey was designed specifically for this study. The nominal data was collected. The survey took no longer than 10 minutes to complete.

Twenty-five surveys were sent to a randomly selected sample for this study. Fifteen surveys were completed and returned, which made the response rate 60%. Table were created showing the frequencies and ranking by percent of the responses for each survey question. The mean and standard deviation were statistically calculated. Each research question will be stated and the survey question that best answers the research question will be identified and the data displayed.

Research Question One

How well are the radiographer program graduates meeting the needs of business and industry? Survey questions number one and five best answered this question. Employers were asked how they rated the graduate's level of knowledge of radiography. This is the data that was collected:

Survey Question #1

Table 1 **Knowledge of Radiography**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	3	11	1	0
Mean	3.1			
SD.	.52			
Ranking	20%	73%	6%	0

Employers felt that 73% of LTC radiographer graduates had a good knowledge of radiography; whereas 20% had excellent knowledge and 6% had a fair knowledge. The mean

was calculated to be 3.1. With a standard deviation of .52, there seems to be a good agreement by the respondents.

Survey Question #5

Employers were asked if their LTC employees met the needs of the department. This is the data that was collected:

Table 2 **Meets the Needs of the Department**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	6	9	0	0
Mean	3.4			
SD.	.84			
Ranking	40%	60%	0%	0%

The employers rated the graduates as 60% of them were meeting the needs of the department; whereas 40% did an excellent job of meeting the needs. The mean calculated for this question was 3.4. With a standard deviation of .84 there seems to be a fair agreement by the respondents on this question. The subjects agreed that the graduates met the needs of their departments.

By using the data from these two survey questions to answer research question one, employers rated the graduates as having displayed good knowledge of radiography and they are doing a good job of meeting the needs of the business and industry.

Research Question Two

What are the radiographer graduates' job entry level skills, behaviors, and knowledge expected by business and industry? Survey questions number two, six and nine asked this question the best.

Survey Question #2

The subjects were asked their level of job satisfaction on the graduates' customer service skills. This is the data that was collected:

Table 3 **Customer Service Skills**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	2	13	0	0
Mean	3.1			
SD.	.35			
Ranking	13%	87%	0%	0%

Eighty seven percent of the graduates displayed good customer service skills; whereas 13% of graduates had excellent skills. The calculated mean was 3.1 and with a standard deviation of .35 there seems to be a very good agreement by the respondents. Employers rated the graduates as having good customer service skills.

Survey Question #6

The subjects were asked how they rated the graduate radiographers' level of initiative. This is the data that was collected:

Table 4 **Level of Initiative**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	4	8	3	0
Mean	3.1			
SD.	.70			
Ranking	26%	53%	20%	0%

Employers rated the graduates as 26% having excellent level of initiative, 53% as having good levels and 20% as having fair level of initiative. The calculated mean of 3.1 and a standard deviation of .70, there seems to be a fair agreement by the respondents on this question. The majority of graduates have a good level of initiative.

Survey Question #9

Employers were asked to rate the graduates on a variety of radiographic skills. The first skill is on positioning. The data is presented in the table below:

Table 5 **Positioning**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	4	11	0	0
Mean	3.3			
SD.	.46			
Ranking	27%	73%	0%	0%

Seventy three percent of the graduates were rated as having good positioning skills, with 27% having excellent skills. With a calculated mean of 3.3 and a standard deviation of .46, there seems to be a good agreement amongst the respondents. Graduates display good knowledge of positioning skills.

This radiographic skill is technique selection. The data collected is in the following table below:

Table 6 **Technique Selection**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	3	12	0	0
Mean	3.2			
SD.	.41			
Ranking	20%	80%	0%	0%

Employers rated 80% of the graduates as having good technique selection skills, 20% of the graduates had excellent skills. The calculated mean was 3.2 and with a standard deviation of .41 it seems that the respondents are in good agreement about this question. The data showed that graduates have good technique selection skills.

The next radiographic skill that the subjects rated was on radiation protection. This is the data collected:

Table 7 **Radiation Protection**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	4	11	0	0
Mean	3.3			
SD.	.46			
Ranking	27%	73%	0%	0%

Seventy three percent of the graduates were rated as having good radiation protection skills, 27% had good skills. The mean was calculated to 3.3 with a standard deviation of .46 which suggest that the respondents were in good agreement of their answers. The data collected showed that graduates have good to excellent radiation protection skills.

Patient care was the next radiographic skill rated by the subjects. The following table contains this data.

Table 8 **Patient Care**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	5	9	1	0
Mean	3.3			
SD.	.55			
Ranking	33%	60%	6%	0%

Employers rated LTC graduate radiographers as 33% having excellent, 60% having good and 6% having fair patient care skills. The calculated mean was 3.3 and with a standard deviation of .55, there appears to be a good agreement by the respondents on this question. From the data shown, graduates have good patient care skills.

The last radiographic skill that employers were asked to rate was about film quality. This is the data that was collected:

Table 9 **Film Quality**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	3	12	0	0
Mean	3.2			
SD.	.41			
Ranking	20%	80%	0%	0%

The data collected from the instrument used stated that employers rated graduates as 80% having good and 20% having excellent film quality skills. With a mean of 3.2 and a standard deviation of .41 suggesting that the respondents have a good agreement on this question.

In summary of research question two, the survey data showed that the radiographer graduates have good job entry level skills, behaviors, and knowledge expected by business and industry.

Research Question Three

Is there any difference in entry level skills, behaviors, and knowledge expected by industry compared to what they are receiving? Survey questions number seven and eight best answered this question.

Survey Question #7

Employers were asked how they rated the graduates' interpersonal communication skills. The data collected is shown in the following table:

Table 10 **Interpersonal Communication Skills**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	5	8	2	0
Mean	3.2			
SD.	.68			
Ranking	33%	53%	13%	0%

The employers ranked 33% of the graduates having excellent, 53% having good and 13% having fair interpersonal communication skills. The mean was calculated as 3.2 with a standard deviation of .68 which suggested that the respondents are in fairly good agreement in their answers. The data showed that graduates displayed good interpersonal communication skills.

Survey Question #8

The subjects were asked to rate the graduates' level of problem solving skills. The data is presented in this table below:

Table 11 **Problem Solving Skills**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	4	8	3	0
Mean	3.1			
SD.	.70			
Ranking	26%	53%	20%	0%

From the data 26% of the graduates had excellent, 53% had good and 20% had fair problem solving skills. With a calculated mean of 3.1 and a standard deviation of .70, this suggested that the respondent were in some agreement with their answers. Graduates had above average problem solving skills.

In summary is there no difference in entry level skills, behaviors, and knowledge of LTC graduate radiographers expected by industry compared to what they are receiving. The data showed that the graduates are meeting the industry's expectations.

Research Question Four

To what extent can the radiographer graduates from LTC successfully compete against other graduates of similar programs? Survey questions number four and ten best answered this question.

Survey Question #4

The subjects were asked how well LTC's graduates competed with other graduates from other programs. This is the data collected:

Table 12 **Competently Competes With Other Graduates**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	8	4	3	0
Mean	3.3			
S.D.	.82			
Ranking	53%	26%	20%	0%

Fifty three percent of the graduates do an excellent job of competently competing with other graduates. Twenty six percent of the graduates do a good job of competently competing with other graduates. Twenty percent of LTC graduates do a fair job of competently competing with other graduates of other programs. With a calculated mean of 3.3 and a standard deviation of .82 which suggested that the respondents are in fair agreement with their answers.

Survey question number ten, the subjects were asked if they would consider LTC graduates for future employment as radiographers. One hundred percent of the subjects said they would consider them for future employment.

In summary, the radiographer graduates from LTC did a good job of successfully competing against other graduates of similar programs.

Research Question Five

Are the graduates able to perform competently with new technologies in your department? The survey question that best answered this question is survey question number three.

Survey Question #3

Employers were asked their level of satisfaction on how well the graduates adapt to new technologies. This the data collected:

Table 13 **Adaptation to New Technologies**

	EXCELLENT	GOOD	FAIR	POOR
	4	3	2	1
Frequency	5	8	2	0
Mean	3.2			
S.D.	.68			
Ranking	33%	53%	13%	0%

Thirty three percent of graduates did an excellent job, 53% did a good job, and 13% did a fair job of adapting to new technologies. The mean was 3.2 and the standard deviation of .68 suggested that the respondents were in close agreement. The data showed that the employers were satisfied with how well the graduates adapted to new technologies in the work place.

There was also a space where the subjects could add comments. These are the comments that were collected:

- I find that the clinical experience is what makes the difference in the grad. Some sites just don't offer the variety of exams and experience that others do. Based on the clinical experiences some grad come out better prepared and more confident.
- Obviously there is variation amongst individual students – having experience with more than 1 college – WCTC/LTC does a wonderful job of training and turning out well prepared young professionals.

- LTC students are all completely different and I don't feel you can lump sum them. Some come out of the program strong because they are good learners and others only muster through them and come out bitter students who feel the program was poor and failed them with the variety of students that come through. I fell it is quite difficult to group them together.
- I have a PM shift employee from Lakeshore Technical College who is doing an excellent job
- Only worked 14 months for us

Summary

In summary, the research questions were answered by using the data provided by employers' completed surveys. Graduate radiographers displayed good knowledge of radiography. The graduates have good job entry level skills, behaviors, and knowledge expected by business and industry. There no difference in entry level skills, behaviors, and knowledge of LTC graduate radiographers expected by industry compared to what they are receiving. The graduates are meeting the industry's expectations. The radiographer graduates from LTC did a good job of successfully competing against other graduates of similar programs. The employers were satisfied with how well the graduates adapted to new technologies in the work place.

Chapter Five

Summary

In chapter five a brief summary of the study will be described. The data supporting each research question will be summarized. A conclusion for each research question will be stated, with any recommendations.

The study was used to evaluate the effectiveness of the Lakeshore Technical College Radiologic Technology program. In this study the employers of LTC graduates, in the Wisconsin area, were surveyed. The researcher asked the employers if these students were adequately prepared to work effectively as entry level radiographers in today's workforce. Different characteristics of a competent entry level radiographer were explored. The employers gave the researcher feedback as to how competitive LTC students were to other similar programs graduating students in the same discipline. The program's strengths and weaknesses were identified. The data was collected between June and October, 2006. This study gave information to identify if LTC's program was meeting the standards spelled out by the accrediting agency, JRCERT.

Research Question One

Research question one asked, how well are the radiographer program graduates meeting the needs of business and industry? The data showed that employers felt that 73% of LTC radiographer graduates had a good knowledge of radiography; whereas 20% had excellent knowledge and 6% had a fair knowledge. The employers also rated the graduates as 60% of them were meeting the needs of the department; whereas 40% did an excellent job of meeting the needs.

Based on the data, it can be concluded that employers rated the graduates as having displayed good knowledge of radiography and they are doing a good job of meeting the needs of the business and industry.

Research Question Two

Research question two asked, what are the radiographer graduates' job entry level skills, behaviors, and knowledge expected by business and industry? The data showed 87% of the graduates displayed good customer service skills; whereas 13% of graduates had excellent skills. Employers also rated the graduates as 26% having excellent level of initiative, 53% as having good levels and 20% as having fair level of initiative. Seventy three percent of the graduates were rated as having good positioning skills, with 27% having excellent skills. Employers rated 80% of the graduates as having good technique selection skills, 20% of the graduates had excellent skills. Seventy three percent of the graduates were rated as having good radiation protection skills, 27% had good skills. Employers rated LTC graduate radiographers as 33% having excellent, 60% having good and 6% having fair patient care skills. The data collected from the instrument used stated that employers rated graduates as 80% having good and 20% having excellent film quality skills.

Based on the data collected for research question two, it can be concluded that the radiographer graduates have good job entry level skills, behaviors, and knowledge expected by business and industry.

Research Question Three

Research question three asked, is there any difference in entry level skills, behaviors, and knowledge expected by industry compared to what they are receiving? The data showed that employers ranked 33% of the graduates having excellent, 53% having good and 13% having fair

interpersonal communication skills and from the data 26% of the graduates had excellent, 53% had good and 20% had fair problem solving skills.

Based on the data, it can be concluded that there is no difference in entry level skills, behaviors, and knowledge of LTC graduate radiographers expected by industry compared to what they are receiving. The data showed that the graduates are meeting the industry's expectations.

Research Question Four

Research question four asked, to what extent can the radiographer graduates from LTC successfully compete against other graduates of similar programs? The data showed that 53% of the graduates do an excellent job of competently competing with other graduates. Twenty six percent of the graduates do a good job of competently competing with other graduates. Twenty percent of LTC graduates do a fair job of competently competing with other graduates of other programs. One hundred percent of the subjects said they would consider LTC graduate radiographers for future employment.

Based on the data, it can be concluded that radiographer graduates from LTC did a good job of successfully competing against other graduates of similar programs.

Research Question Five

Research question five asked, are the graduates able to perform competently with new technologies in your department? The data showed, 33% of the graduates did an excellent job, 53% did a good job, and 13% did a fair job of adapting to new technologies.

Based on the data it can be concluded that the employers were satisfied with how well the graduates adapted to new technologies in the work place.

Conclusion

Lakeshore Technical College School of Radiology mission statement stated that it is designed to deliver state of the art radiography courses to meet the needs of Wisconsin's communities for qualified radiographers. The graduates of the radiographer's program should function as competent, proficient health care professionals. The radiographers should display concern for technical competency and quality patient care. They will also utilize continuing education as a means of maintaining those skills consistent with new technology.

There was limited current data available that evaluates how well prepared the students graduating from Lakeshore Technical College (LTC) Radiologic Technology programs are. The data from this study showed that the students graduating from this program are competent to enter an entry level job as a radiographer. LTC's graduates are successfully prepared to compete in today's workforce.

JRCERT expects that radiographic programs have developed a method of planning and evaluation demonstrating program effectiveness in relation to student achievement. The goals of these standards are to protect students, the public, and promote program improvement. Standard One says that one of the ways that programs can identify its effectiveness is to measure employers' satisfaction. The program's strengths and weaknesses were identified. The program should analyze this data for continuous improvement of the program.

This study could be used as a tool to evaluate the effectiveness of LTC's Radiologic Technology program and identify the program's strengths and weaknesses. The study has shown that Lakeshore Technical College does have an effective Radiologic Technology program. Lakeshore Technical College School of Radiologic Technology's program has met the standards

spelled out by the accrediting agency, JRCERT. This study will be shared with LTC's Radiologic program administrators.

Recommendations

The researcher recommends that a similar study be done in 5 years. One change that the researcher suggested is that the survey be done on specific graduates, after getting permission from the graduates. More accurate data maybe obtained by targeting specific graduates in this way.

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Appendix A: Instrument- Survey

Employer Satisfaction Survey

As part of my technical paper for my master's degree, I am interested in the employer's impression of how well LTC graduates are prepared to work as entry level radiographers. This information will be treated confidential and will be shared with with the radiographer program. This project has been reviewed by the UW Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.
Gayle Borchert

	4-Excellent	**3-Good**	**2-Fair**	**1-Poor**
Please circle the most appropriate answer.				
LTC graduates entry level				
1. Knowledge of radiography	4	3	2	1
2. Customer service skills	4	3	2	1
3. Adaptation to new technologies	4	3	2	1
4. Competently competes with other graduates	4	3	2	1
5. Meets the needs of the department	4	3	2	1
6. Level of initiative	4	3	2	1
7. Interpersonal communication skills	4	3	2	1
8. Problem solving skills	4	3	2	1
9. Radiography skills				
Positioning	4	3	2	1
Technique selection	4	3	2	1
Radiation Protection	4	3	2	1
Patient care	4	3	2	1
Film quality	4	3	2	1

10. Would you consider LTC graduates for future employment as radiographers? yes no

Comments:

Thank you for your assistance by providing this information.
Please return this survey in the envelop provided.