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Title: Analysis of the Influence of an In-House Certification Program on the Development of Pharmacy Technicians in a Large Healthcare Company

The accompanying research report is submitted to the University of Wisconsin-Stout, Graduate School in partial completion of the requirements for the

Graduate Degree/ Major: MS Career and Technical Education Degree

Research Advisor: Debbie Stanislawski, PhD. Professor & Program Director, Marketing and Business Education

Submission Term/Year: Fall 2019

Number of Pages: 77


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Director, Office of Graduate Studies: DATE:
Haynes, Alyssa M. *Analysis of the Influence of an In-House Certification Program on the Development of Pharmacy Technicians in a Large Healthcare Company*

**Abstract**

The purpose of this study was to investigate the influence of a pharmacy technician certification training program on the development of pharmacy technicians. This study focused on a large healthcare organization that sought to increase the successful certification of technicians in its corporate office setting. Dispensing errors, privacy violations, and other mistakes put patients and customers at risk, so having trained and certified technicians is essential. A mixed methodology was used for this study, which included historical research using existing quantitative data, and qualitative research via interviews with the program participants to gather additional data on their experience with the current course design. The training program is offered as a self-paced eLearning format during the participant’s normal workday. Learners indicated that the eLearning format was convenient and effective at teaching topics surrounding pharmacy technician certification; however, it was found that the eLearning course was not producing desirable completion rates and final practice exam pass rates. Learners indicated that the amount of information in the course was overwhelming. They also indicated that having an instructor may have been more helpful, and more time and attention could be spent on complex topics such as pharmacy math and pharmacy law.
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Chapter I: Introduction

Pharmacy technicians provide critical support to pharmacists in healthcare settings. Technicians can assist in entering prescriptions, managing insurance claims, doctor and patient outreach, inventory, scheduling, and many other tasks that allow pharmacists to focus on more skilled work and operate at the top of their license. The scope of a pharmacist’s work has changed from dispensing responsibilities to patient-centered care. Pharmacy technicians have filled the gap of dispensing medications as the pharmacist’s focus has switched (Alkhateeb, Shields, Broedel-Zaugg, Bryan, & Snell, 2011). As pharmacy technicians are expected to take on more technical responsibilities, the need for adequate training becomes more pressing (Manasse & Menighan, 2010).

Dispensing errors, Health Insurance Portability and Accountability Act (HIPAA) violations, and other mistakes are major concerns for healthcare industries. One way to reduce these errors is to require more stringent, standardized training and certification for pharmacy technicians (Manasse, 2007). Currently, the certified pharmacy technician designation is not a requirement in all states. There is very little control on pharmacy technician training requirements throughout the country (Anderson, Draime, & Anderson, 2016). The topic has been discussed regularly on a national level over the last 30 years, but no national regulation has been achieved (Stuhan, 2010).

One organization that has offered a standardized certification for the last 25 years is the Pharmacy Technician Certification Board (PTCB). Over the years, the PTCB certification has become recognized by many pharmacy employers and has been accepted as the national standard by more than half of the state boards of pharmacy in the United States (Muenzen, Corrigan, Smith, & Rodrigue, 2005). The National Association of Boards of Pharmacy (NABP) has
recognized that those who earn the PTCB Certified Pharmacy Technician (CPhT) designation can perform their technician duties safely and effectively (Muenzen et al., 2005).

An expanding pharmacy workforce and shortage of certified technicians increases the importance for businesses to develop and retain talent (Hawthorne & Anderson, 2009). Both pharmacists and pharmacy technicians indicate that insufficient staffing is one of the most common reasons that they intend to leave their current positions (Wuliji, 2009). The current pharmacy technician shortage comes, in part, from a 2016 government crackdown on for-profit technical colleges. Many schools that offered pharmacy technician training were closed as a result of the changes in the for-profit industry (Hamstra, 2018).

Because of the lack of regulation for pharmacy technician certification and training programs, and shortage of qualified candidates, some companies provide in-house training programs designed to prepare candidates for the PTCB exam. The Society for Human Resource Management (2018) notes that employee training and development is a key retention strategy, as employees who are not given opportunities to advance their skills are more inclined to leave.

One healthcare company that operates a large-scale mail order pharmacy developed a certification program called Tech Path to Certification, as they were struggling with finding already qualified candidates in the market. The goal of this program was to offer entry level employees the opportunity to take a class to prepare them to take the Pharmacy Technician Certification Exam (PTCE). After completing the course and passing the exam, technicians-in-training could be promoted to a pharmacy technician role.

**Statement of the Problem**

The healthcare insurance company’s Tech Path to Certification training will be the focus of this study. Completion of the Tech Path to Certification program and pass rates of the PTCE
are very low for the healthcare company. Dispensing errors, privacy violations, and other mistakes put patients and customers at risk. The NABP has recognized that those who pass the PTCE can perform their technician duties safely and effectively (Muenzen et al., 2005). First, it is not known whether offering the training program in an eLearning format is positively affecting practice exam and course completion rates. Second, it is not known whether offering the training program in its current format is adequately preparing students for the PTCE. Lastly, it is not known what Tech Path to Certification participants are perceiving the strengths and opportunities of the training to be relative to preparing for the PTCE.

**Purpose of the Study**

The goal of this research is to analyze the effect of the current certification program on the course completion rates and pass rates on the practice exam. This study will also gather learner perceptions on the effectiveness of the training program. The certification classes were previously offered outside of normal work hours in an instructor-led format with PowerPoint presentations. The Tech Path curriculum has been re-designed as a self-paced eLearning option, and the course is now provided during normal work hours. It is unknown whether the change to offering the course as an eLearning option or offering the course during normal work hours will increase practice exam pass rates and course completion rates. The study will look at the results of the redesigned Tech Path to Certification initiative, as well as review literature and available data surrounding certification training practices in other pharmacies and/or healthcare organizations. In addition, it will gather participant perceptions of their preparation for the certification exam in an effort to examine what is working and what can be improved within the training.

The following information outlines the importance of this study:
1. The study provides data on certification training practices that could be used to design an effective training path for pharmacy technicians.

2. The study provides data on the effect of offering training during normal work hours that could be used to increase retention and decrease staffing costs due to turnover.

3. Research surrounding pharmacy technician certification is particularly important in healthcare, as dispensing errors can have serious health implications, including patient death (Manasse, 2007).

4. The pharmacy space is lacking in developing an evidence base related to studies in education and workforce development (Wuliji, 2009).

5. This topic aligns with the National CTE Research Agenda’s Research Problem Area (RPA) 5: Program Relevance and Effectiveness. The topic aligns with Research Objective (RO) 5.3: Relevance of Workforce Standard (Lambeth, Elliot, & Joerger, 2008). This RPA seeks to examine industry credentials for program completers. This study could be used to examine best practices for creating programs to credential pharmacy technicians.

**Research Questions**

The outcomes of the study will be utilized to answer the following questions:

1. What effect does offering the certification program in an eLearning format during normal work hours have on course completion rates and practice exam pass rates?

2. To what degree did offering the certification preparation program in an eLearning format with a practice exam prepare participants for the official PTCE exam?

3. What were the learners’ perceptions of the Tech Path to Certification training?
Limitations of the Study

The study has the following limitations:

1. This study is limited to a sample of potential pharmacy technicians employed at one healthcare company, and a review of information available from similar companies.

2. The healthcare company in this study focuses primarily on insurance, although they do own several large mail order pharmacies. This study may differ for other companies whose focus is retail or hospital business.

3. Because data from the previous instructor-led course design is not available, a comparison of the two course designs cannot be completed. This study is limited to the analysis of the current eLearning course design and participant perspectives.

4. This study does not analyze the learners’ backgrounds prior to employment with the healthcare company. The sample of potential pharmacy technicians may be influenced by prior education or experience.

Definition of Terms

The definitions outlined below will assist the reader in interpreting this study.

Certified pharmacy technician (CPhT). This refers to a situation in which a candidate completes the PTCB certification exam with a passing score and is rewarded a certification number (PTCB, 2017b).

eLearning. This refers to learning using electronic technology to access learning content. This is completed outside of a traditional classroom, and is often delivered completely online (eLearningNC, 2019).
**Multimedia instruction (MMI).** This is a type of instruction which incorporates a variety of digital media into the course content, for example, the use of computer technology such as a tutorial or simulation (Stegeman & Zydney, 2010).

**National Association of Boards of Pharmacy (NABP).** This is the organization that seeks to protect public health by overseeing pharmacist competence assessment programs and license transfers (National Association of Boards of Pharmacy, 2019).

**Pharmacy Technician Certification Board (PTCB).** This is the organization that develops and administers certification and recertification requirements for pharmacy technicians (Muenzen et al., 2005).

**Pharmacy Technician Certification Exam (PTCE).** This refers to the two-hour, multiple-choice exam that the PTCB utilizes to assess a candidate’s ability to practice as a pharmacy technician (PTCB, 2017b).

**Methodology**

A mixed methodology was used for this study. Comparative historical research was utilized reviewing existing quantitative data to compare learner performance and successful completion rates of the current curriculum. Interviews occurred with the participants to gather additional data on their experience with the course design and usefulness of the course content and practice exam. This mixed-method approach was used to help avoid a single-method bias, and to gather both quantitative and qualitative data (Wiersma & Jurs, 2009).
Chapter II: Literature Review

This study is intended to investigate the influence of an in-house certification training on the development of pharmacy technicians. The focus of this study includes a large healthcare organization that seeks to develop certified pharmacy technicians in-house; therefore, this chapter will review the history of training and development, as well as the link between training and employee retention. A discussion of the best practices for training healthcare professionals will be presented. The chapter will conclude with the types of preparatory programs that exist for pharmacy technician certification.

History of Training and Development

Over the past 100 years, training and development has evolved as employee and business needs have changed. Training and development emerged in the United States during the early 1900s. According to Peterson (1987), Henry Gantt was one of the first consultants to believe that teaching could increase productivity. Gantt believed that extensive training was required before a worker could perform a job properly, and workers could rarely perform a task correctly on the first try (Peterson, 1987).

During World War II, the need for skilled workers increased exponentially due to the wartime economy and technology developments of the time (Torraco, 2016). The Training Within Industry (TWI) service was created in partnership with the U.S. War Manpower Commission to train millions of new workers and foreman needed to produce military hardware and other products in 1940 (Torraco, 2016). Because the war took away experienced workers and supervisors, companies had to find new ways to quickly build a workforce. During this wartime economy, the popularity of training managers increased (Kraiger, 2014). Training and
development became established in many companies, and continued after the war ended (Torraco, 2016).

Employers have gone from requiring workers to complete simple, manual tasks, to needing workers with complex problem solving and reasoning abilities. An analysis of research articles published in the *Journal of Applied Psychology* revealed that since the first training-related article written in 1918, there has been a steady growth in training research over the past century (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017). The focus of research evolved from human relations and supervisory skills in the 1940s and 1950s, to cross-cultural and team training in the 1960s and 1970s, to learner-centered research in the 1980s (Bell et al., 2017). Training in this era showed an appreciation for learners as individuals and focused on learner autonomy and cognition using computer instruction, case studies, and role-plays (Kraiger, 2014). Overall, the content of research has progressed from the evaluation of specific training efforts, to broader theories that focus on learner-centered training and learning that occurs through work experience (Bell et al., 2017).

Interest in training and development continued to grow, and in the 2000s, more training articles were published than in any other decade (Bell et al., 2017). It can be seen from the history of training and development that there was a steady progression in transferring responsibility from supervisors, to individual learners (Kraiger, 2014). Today, organizations of all types and sizes spend time and resources on training and development, and almost every working adult will participate in training and development at some point in their career (Bell et al., 2017). Today’s learners are often responsible for independently making sense of a lot of information, more and more frequently in remote locations as opposed to in-person (Kraiger,
This suggests that organizations may need to re-evaluate training to fit both in-person and virtual audiences.

**Training and Employee Retention**

Today, effective training and development programs are used not only as a way to increase employee skills, but also for organizations to gain competitive advantage (Bell et al., 2017). Current workforce challenges include economic instability and rapid advances in technology (Johennesse & Chou, 2017). Maintaining a stable workforce and keeping turnover low is an important issue for all organizations. Retaining expertise and experience in the workforce is indicative of a strong organization (Nandan & Agrahari, 2018). Career development and other training that creates opportunities for employees to increase skills and grow within their companies have a direct effect on employee retention (Hassan, Razi, Qamar, Jaffir, & Suhail, 2013).

Businesses that focus on developing talent will better be able to retain key talent (Boxall & Purcell, 2011). Nandan and Agrahari (2018) examined several studies surrounding training and employee retention. The research indicates that companies that offer effective training opportunities to employees have higher employee retention. Another study of training and employee engagement suggests that employees prefer on-the-job training to attending training outside of business hours (Hassan et al., 2013). The on-the-job training option also seemingly increased feelings of loyalty towards the employer (Hassan et al., 2013).

Learning that occurs from training and development opportunities fosters a sense of growth, which makes employees less inclined to leave (Hassan et al., 2013). Studies have also linked effective training to better employee engagement and employer branding (Nandan & Agrahari, 2018). Advancement opportunities increase employee commitment and satisfaction,
which can decrease turnover (Anis, Nasir, & Safwan, 2011). It is important to note that training and employee retention have a correlation to increased compensation, as well as training need and usefulness (Anis et al., 2011). This means that in order to be successful, there should be a need for training, and employees should receive increased compensation after successfully expanding their skills.

Studies surrounding training and employee retention indicate promising results for employers who invest in their employee’s development. The research analysis completed by Nandan and Agrahari (2018) included a large body of both past and current research that shows a strong connection between training programs and employee retention, engagement, and satisfaction. However, none of these studies were completed specifically within the healthcare industry. The research completed by Hassan et al. (2013) focused on the telecommunication industry and provided an analysis of surveys distributed to 100 employees in one company. Additional studies need to be completed on employee views of on-the-job versus after hours training opportunities to strengthen the research findings of this study. In addition, further clarification could be provided around the definition of employee retention. It is not clear what duration of employment after training occurs would be considered successful employee retention. This definition could vary from study to study, and from company to company.

**Maslow’s Hierarchy and employee retention.** One theory that may contribute to employee retention through training is Maslow’s Hierarchy of Needs. Maslow was a psychologist known as the “father” of motivational studies (Johennesse & Chou, 2017). He outlined the levels of human needs which include (Johennesse & Chou, 2017):

1. Psychological needs
2. Safety and security
3. Social needs
4. Esteem
5. Self-actualization

Employees must have their needs met in the lower levels before progressing to higher levels. Assuming that employees have their basic needs met in level one (survival), providing training and development opportunities can fulfil needs in other levels by (Johennesse & Chou, 2017):

- Offering financial safety and security with a paid training option for level two.
- Offering social interaction and participation in training programs with coworkers for level three.
- Increasing self-esteem through strengthening job skills for level four.
- Integrating creative, problem-solving experiences and professional development for level five.

This theory supports the research that suggests that training fulfills the needs of employees and motivates them to stay within their organization (Nandan & Agrahari, 2018).

Training for Healthcare Professionals

Training in the healthcare industry is ever-changing. According to the U.S. Bureau of Labor Statistics (2018), 10 of the top 20 fastest growing occupations between 2016 and 2026 are expected to be healthcare related. The demand for healthcare professionals is partially due to the aging population. People are living longer due to advances in technology. The changing, complex nature of treatments and technology is partially a result of the longevity of the aging population (Roberts, 2012).

Because of the changing nature of healthcare, trainers for healthcare professionals must have the ability to relay new information and update curriculum in a timely manner. Lecture has
historically been the primary method for training healthcare professionals (Roberts, 2012). Lecture can be useful for presenting the most current information, as the time between research and publication can take years (Roberts, 2012). Lectures may not always be the most effective way to train healthcare workers, however.

Healthcare workers are often faced with complex situations and decisions, requiring on-the-spot problem solving and a high level of critical thinking skills, which are not obtained through lecture (Institute of Medicine, 2010). One way to prepare healthcare professionals for complex situations is learning through case studies and simulation (Institute of Medicine, 2010). This can allow students to practice their skills and link conceptual knowledge and applied skills that have been demonstrated through textbook and lecture. Simulations also allow students to practice skills more effectively in a safe environment without risk to patient safety (Institute of Medicine, 2010). According to a patient safety study, medical experts and collaborators, such as pharmacists and pharmacy technicians, have a high potential for gaining skills through simulation-based learning (Aggarwal et al., 2010).

Pharmacy technicians have less of a need for physical simulations such as those analyzed in the Roberts (2012) study. Job duties are not completed on live patients, as with doctors and nurses, so simulation mannequins would not be useful in the pharmacy field. More research is required on pharmacy-specific simulations, such as dispensing and counting medications, compounding medications, and preparing IV medications in a pharmacy setting. These simulations would provide a safe way for technicians to practice their job duties without risk to patient safety.

Knowledge-based reference tools are also useful in the healthcare world, for example, a compendium such as Clinical Pharmacology, which is a large reference database for drug
information (Clinical Pharmacology, 2019). These support tools have a wealth of knowledge from current cases, can be easily updated, and can be used to support initial training to help understand complex issues and requirements (Coulson-Thomas, 2010). Tools such as Clinical Pharmacology are widely used and accepted by pharmacy professionals, which suggests it is a sound source of knowledge industry-wide.

According to Stegeman and Zydney (2010), multimedia instruction (MMI) can create a student-centered, self-paced, interactive learning environment that is beneficial in supporting critical thinking skills. The key to training healthcare professionals is to design learning activities that, “cognitively engage the learner to think about the meaning and relevance of the material presented, its application, and the various contexts to which it can be applied” (Stegeman & Zydney, 2010, p.131).

**Multimedia instruction.** The use of multimedia instruction (MMI) may be more beneficial than traditional training methods for attaining the knowledge and skills required for healthcare professionals. In one study, Stegeman and Zydney, (2010) examined the effectiveness of supplementing lecture with MMI by randomly assigning learners to one of three groups. The groups included (a) lecture and exposure to MMI cases, (b) lecture and participation in a seminar group with the same cases, and, (c) lecture only. Learners were given a pre-survey and a post-survey. Analysis of the surveys indicated that students in the lecture and MMI group scored significantly higher for knowledge retention than the other two groups. Similar results were revealed for attaining a skill and retaining the knowledge and skills. Overall, the research concluded that MMI is just as beneficial, if not more beneficial than traditional teaching methods. (Stegeman & Zydney, 2010).
The Stegeman and Zydney (2010) study provided important insight for utilizing MMI for healthcare professionals. This study, however, was completed in a higher education setting with dental students and may not transfer completely to training provided by employers. Although the use of supplementing lecture with MMI and technology into a blended learning approach seems promising for the design of training for healthcare professionals, additional research needs to be conducted on features and conditions that influence the effectiveness of this type of training (Bell et al., 2017). Currently, many studies focus solely on comparing different media. Also, there is a need for more research on how job demands, work-life conflict, and other stressors influence a learner’s participation in MMI within working hours and non-working hours (Bell et al., 2017).

**eLearning.** A certain type of MMI, self-paced eLearning, could be another option for training healthcare professionals. Due to the complex nature of some healthcare topics, trainers could spend more time on complex topics through face-to-face lecture if learners are exposed to basic knowledge through eLearning (Jacot, Noren, & Berge, 2014). eLearning may also be utilized for simulating or completing case studies of on-the-job tasks and getting users acquainted with tools through hands-on practice instead of learning through watching others demonstrate (Kraiger, 2014). Employees can transfer training more efficiently when they can use newly learned information within their workplace right away (Kraiger, 2014). Trainers must be able to implement eLearning tools and methods skillfully to accommodate this development.

A study conducted by Delf (2013) developed a standalone eLearning program to train healthcare professionals to read radiographic bone scans and complete reports. This small-scale study utilized the ADDIE method of instructional design to create the eLearning, and 31 volunteers participated in the training pilot. The study concluded that usability and interactive
features were highly effective, while overly detailed information that was not easily transferrable detracted from learning (Delf, 2013). Overall, a statistical increase in performance was reported. This study was small, and again, not directly related to the pharmacy technician role. The study demonstrates that it is feasible to successfully train healthcare technicians utilizing an eLearning only option.

Another study sought to evaluate the effectiveness of eLearning for occupational physicians (Hugenholtz, de Croon, Smits, van Dijk & Nieuwenhuijsen, 2008). The Hugenholtz et al. (2008) study was randomized, controlled, and divided the 74 learners into four groups. Two of the groups received lecture-based training, and two of the groups received eLearning. The lessons each contained the same 30 minutes of content, and learners in all groups completed the same final assessment. The study concluded that an eLearning course for the occupational physicians was just as effective as lecture (Hugenholtz et al., 2008).

The studies discussed in this section and the literature reviewed provides support for the use of eLearning for healthcare employees, however, content taught to one specialty group of healthcare workers is not directly relatable to another. In addition, a limitation of these studies is that performance was assessed only directly after training. It may be valuable to re-assess performance to measure long-term knowledge retention. In addition, more studies need to be completed on eLearning as a standalone option for healthcare professionals.

Pharmacy Technician Training and Certification

The specific healthcare professionals that are the focus of this study are pharmacy technicians. Shortages in the healthcare workforce surfaced in the 1970s, and shortages of pharmacists have been reported since the early 1990s (Hawthorne & Anderson, 2009). With the shortage of pharmacists, pharmacy technicians have been expected to take on more complex,
technical responsibilities. Because of this, the need for adequate training has become more pressing. Maintaining the quality of the pharmacy profession by obtaining high-quality applicants is also a pressing matter (Manasse & Menighan, 2010).

A quality, well-trained pharmacy workforce is important, as dispensing errors, HIPAA violations, and other mistakes are major concerns for pharmacies. One way to reduce these errors could be to adopt standardized training and certification for pharmacy technicians nationwide (Manasse, 2007). There is increased international support for the certification and regulation of pharmacy technicians, as well as the accreditation of pharmacy training courses (Hawthorne & Anderson, 2009). Despite the push for certification, currently little to no data exists on how many errors certified pharmacy technicians make compared to those who have not completed formal training (Myers, 2011).

In a 2016 study, 698 pharmacy technician training programs were identified through internet research (Anderson et al., 2016). Complete information was received from 216 of the programs. Nearly 30% of the programs were accredited through the American Society of Health-System Pharmacists (ASHP), 8% were pending accreditation, and 62% were unaccredited or unidentified (Anderson et al., 2016). Of the 216 programs, 65% were affiliated with PTCB (Anderson et al., 2016). Despite the high number of pharmacy technician training programs found, this study did not include training programs provided by employers, as this information is generally not readily available through internet research. Although this study provided valuable information on the variety of technician training programs available, it did not address effectiveness, outcomes, and graduation rates for the different types of programs. More studies are required on the effectiveness of pharmacy technician training programs that include employer-sponsored initiatives.
The PTCB has offered industry-standardized certification for the last 25 years, and this certification has been accepted as the national standard by more than half of the state boards of pharmacy in the United States (Muenzen et al., 2005). The NABP has recognized that those who earn the CPhT designation can perform their technician duties safely and effectively (Muenzen et al., 2005). Currently, the certified pharmacy technician designation is not a requirement in all states, including Wisconsin. Pharmacy technician training is highly decentralized. There is very little control of pharmacy technician training requirements (Anderson et al., 2016).

To become certified, technicians must pass the Pharmacy Technician Certification Exam (PTCE). The PTCE received high marks for both validity and reliability from the NABP (Muenzen et al., 2005). To ensure this quality, the PTCB trains question-writers yearly in developing sound questions, conducts annual question-review workshops involving experienced pharmacy clinicians and educators, replenishes and deletes questions from the question bank annually, and creates four new versions of the PTCE with minimal overlap each year (Muenzen et al., 2005). The PTCE blueprint outlines the following knowledge domains and areas (PTCB, 2018):

- Pharmacology for technicians (13.75%)
- Pharmacy law and regulations (12.5%)
- Sterile and non-sterile compounding (8.75%)
- Medication safety (12.5%)
- Pharmacy quality assurance (7.5%)
- Medication order entry and fill process (17.5%)
- Pharmacy inventory management (8.75%)
- Pharmacy billing and reimbursement (8.75%)
The PTCB has certified 676,786 pharmacy technicians since 1995 (PTCB, 2017a). In 2018, the pass rate of the PTCE was 57%, and overall, the pass rate of the PTCE is 71% since 1995 (PTCB, 2017a).

**On-the-job pharmacy technician training.** Due to lack of regulation, many pharmacies throughout the United States rely on unstructured on-the-job training provided by pharmacists or pharmacy coworkers to train pharmacy technicians. On-the-job training can often be “learn as you go”, without formal instruction. In this method of training, no formal classroom instruction, agenda, or learning materials are provided. The National Pharmacy Technician Association (NPTA) recommends that pharmacy technicians be required to pass a national exam, complete a standardized training, and register with the board of pharmacy in their state to ensure that an individual has the knowledge, skills, and experience required to practice safely (Alkhateeb et al., 2011). The belief is that stricter technician requirements may decrease medication errors (Alkhateeb et al., 2011).

A survey analysis conducted in 2005 revealed that relative to 1999, more employers provided formal, structured on-the-job training (Meunzen et al., 2005). This finding was consistent across various pharmacy work settings. This indicates that pharmacies are adopting the practice of offering more structured training, as opposed to a “learn as you go” system.

**Accredited pharmacy technician training programs.** As of 2013, there are 258 fully accredited pharmacy technician training programs in the country (Anderson et al., 2016). The American Society of Health-System Pharmacists (ASHP) accredits programs that have at least 600 hours of instruction over a minimum of 15 weeks (Bureau of Labor Statistics, 2018). These programs include associate degrees, diplomas, and certificates from vocational, technical, and
community colleges. The programs vary between 540 to 2145 contact hours, with the median being 940 hours (Alkhateeb et al., 2011). In 2009, these accredited programs trained around 12,000 technicians, and over half of the graduates went to the three largest retail drug stores in the country (Alkhateeb et al., 2011). In 2016, the government cracked down on for-profit technical colleges due to misleading and defrauding students. Many for-profit schools that offered pharmacy technician training were closed. This added to the already pressing pharmacy technician shortage (Hamstra, 2018).

Additional research is required on the measures of quality and content of pharmacy technician training programs to determine if these programs are meeting the educational needs of students and employers. A broad analysis of pharmacy technician training programs uncovered the issue of pharmacy professionals not providing input and support to the programs (Anderson et al., 2016). Less than half of the ASHP accredited programs studied had a pharmacist on staff (Anderson et al., 2016). This is problematic, as these programs should have the proper amount of clinical support to be effective and relevant. Some pharmacists insist that pharmacy technician training programs be taught by pharmacists. In a college setting, many programs require instructors to have a certain number of college hours or experience before they can teach a subject (Anderson, 2013). In turn, pharmacy technician training programs should be taught by those with the appropriate level of education and experience.

Unaccredited pharmacy technician training programs. Besides the academic pharmacy technician training programs, there are many unaccredited online programs. These programs are not regulated or designed to meet any professional organization’s standards. Completion of an accredited program is not a requirement for employment or practice in many
states but having completed a program can be more attractive to employers (Alkhateeb et al., 2011).

In a 2016 survey of certified pharmacy technicians, one-third of respondents indicated that they had completed a vocational training program. Many indicated they completed an accredited program, but some indicated that they completed an unaccredited program, or were unaware if their program was accredited or not (Desselle & Holmes, 2017). This is concerning as the unaccredited programs are not regulated, and potential technicians may enroll in these without knowing the difference. No research was uncovered on the instructional techniques and learner successes in unaccredited training programs, which is a large gap in pharmacy technician training research.

**Employer sponsored pharmacy technician training programs.** Because of the lack of regulation for pharmacy technician certification and training programs, and shortage of qualified candidates, some companies provide in-house training programs designed to prepare candidates for work as a pharmacy technician. Desselle & Holmes (2017) indicated that most certified pharmacy technicians are mandated by their employer, rather than state government, to become certified. The healthcare insurance company being focused on in this research requires certification for certain duties, and trains in-house to prepare technicians for the PTCB exam. Many large chain pharmacies such as CVS, Walgreens, and Rite Aid have also developed in-house training programs that are approved by the ASHP (Manasse & Menighan, 2011). Employers recognize the importance of certification, and some provide financial assistance or other incentives for successful completion, such as reimbursement, promotions, and wage increases. Some studies suggest that technicians who are certified remain in their positions longer than non-certified technicians, and that turnover is lower for employers with certified
technicians (Alkhateeb et al., 2011). The healthcare insurance company in this study aims to provide training as a paid incentive, as well as promote technicians-in-training to pharmacy technicians, with a wage increase, upon successful completion of the PTCE.

Overall, formalized training for pharmacy technician certification will not completely replace the need for on-the-job training. For example, a pharmacy technician trained in retail pharmacy will not have all of the experience needed to complete the duties of a pharmacy technician in a healthcare insurance company or a large mail-order pharmacy. In turn, pharmacy technicians employed at an insurance company will not have the skills required to complete the duties in a retail pharmacy. The goal of training and certification is to provide technicians with a broad base to compliment workplace-specific training (Rouse, 2003).

Summary

The history of training and development and links between training and employee retention were analyzed in this chapter to assist in the investigation of the influence of providing an in-house certification training on the development of pharmacy technicians. An analysis of the best practices for training healthcare professionals, and types of pharmacy technician training programs specifically, has also been discussed to consider the best method of training within healthcare organizations.

It is clear from the review of the existing literature that training is a valuable tool for businesses and their employees. The purpose of this research study was to investigate the influence of an in-house certification training program on the development of pharmacy technicians. Research has shown that MMI is effective for training healthcare professionals, and eLearning may be just as effective as lecture for training. This supports the premise of this study to analyze the effects of an eLearning training program to develop pharmacy technicians.
Chapter III: Methodology

The purpose of this study was to investigate the influence of an in-house certification training on the development of pharmacy technicians. This study focused on a large healthcare organization that sought to increase the retention and successful certification of technicians in its corporate office setting. The researcher in this study was an instructional designer employed at the healthcare company which sought to gain information surrounding the effectiveness of the pharmacy technician certification training program. The program is currently offered in a self-paced eLearning format. The goal was to analyze data from the company’s practice exam, as well as analyze the perceptions of the participants on how well the training and practice exam prepared them for the Pharmacy Technician Certification Exam (PTCE). The findings may be used to recommend further updates or identify best practices for training in the industry.

Specifically, the research questions guiding this study were:

1. What effect does offering the certification program in an eLearning format during normal work hours have on course completion rates and practice exam pass rates?
2. To what degree did offering the certification preparation program in an eLearning format with a practice exam prepare participants for the official PTCE exam?
3. What were the learners’ perceptions of the Tech Path to Certification training?

This chapter will discuss the research design, subjects of the research, instrumentation, data collection procedures, data analysis, and limitations of the study.

Research Design

A mixed methodology was used for this study. The intent behind the mixed-method approach was to look at the research problem through a variety of perspectives (Wiersma & Jurs, 2009). In this case it included already existing data, and the collection of new data.
Comparative historical research was utilized reviewing existing quantitative data to analyze learner performance and successful completion rates of the eLearning course. The course format changed from in-person, instructor-led, delivered after business hours, to a self-paced eLearning course offered within normal business hours. Because the data from the previous course design was not available, historical data from the current eLearning design was utilized. Historical research is best applied when events have already happened, and the researcher searches for existing quantitative and qualitative data rather than producing it. Quantitative methods in historical research help provide a solid description of past scenarios (Wiersma & Jurs, 2009).

Interviews occurred with the participants to gather additional data on their experience with the updated course design and usefulness of the course content and practice exam. This mixed-method approach was used to help avoid a single-method bias, and to gather both quantitative and qualitative data (Wiersma & Jurs, 2009). Qualitative and nonexperimental quantitative research was utilized via interviews with learners to gather information on the perceived experiences of the learners in the eLearning course. Because a large portion of designing training revolves around learner experience, and the study was completed in its natural business setting, the qualitative research element was suitable for this study. The nonexperimental quantitative interview survey questions were appropriate as well, as this type of research allows the opportunity for probing questions and elaboration to help gain insight into the learner experience (Wiersma & Jurs, 2009).

The main variable in this study was a successful, passing score on the pharmacy technician practice exam. Other variables include curriculum design, curriculum delivery, and offering the training during normal business hours. The goal was to identify factors that may
Contribute to successful passing scores on the practice exam, and learner preparation for the PTCE by using this mixed-method approach. By gathering multiple forms of data, such as practice exam pass rates, program completion rates, and perceptions, the researcher intended to identify the extent to which employees’ needs are being met, keeping Maslow’s Hierarchy of Needs Theory in mind.

**Subject Selection and Description**

The target population for this study included pharmacy technicians-in-training and aspiring pharmacy technicians at a large healthcare company who were taking the Tech Path to Certification course. This course is intended to prepare potential technicians with the knowledge and information required to pass the PTCB certification exam. The population was comprised of 65 technicians-in-training that completed the Tech Path to Certification training between 2018 and 2019. These individuals were either hired externally as pharmacy-technicians-in-training and expected to obtain certification within six months of hire, or internal candidates, such as customer service representatives who elected to move to a more complex, clinical position. All the learners in the population had at least a high school level education.

All the participants between 2018 and 2019 were included in the historical and nonexperimental quantitative data. A random sample of 11 employees were selected from a report of participants who completed the program, which was pulled from the company’s Learning Management System (LMS) to provide the more detailed qualitative and nonexperimental quantitative interview data. This supports current research methodology that indicates that current studies include interviews with 15 participants, plus or minus 10 (Brinkmann, 2013). This sample included both learners who were successful in passing the practice exam, and those who were not successful. Participation in the study was voluntary, and
no names or specific details were gathered in order to protect the identity of the participants. Their identity remained anonymous and all participants in the study received an informed consent form (see Appendix D) which outlined the ways their information would be protected. Data gathered from this study did not include employee names or other personal information. Names were replaced with participant numbers, which cannot be traced back to any specific individual.

**Instrumentation**

Final practice exams were administered to each learner to measure knowledge gained from the course. The scores from this practice exam were utilized for the historical quantitative research. The practice exam was created by a board of instructional designers, learning facilitators, and clinicians at the healthcare company. The assessment contained 100 questions total, which were created to match the exam blueprint outlined by PTCB. The blueprint outlines the following knowledge domains and areas (PTCB, 2018):

- Pharmacology for technicians (13.75%)
- Pharmacy law and regulations (12.5%)
- Sterile and non-sterile compounding (8.75%)
- Medication safety (12.5%)
- Pharmacy quality assurance (7.5%)
- Medication order entry and fill process (17.5%)
- Pharmacy inventory management (8.75%)
- Pharmacy billing and reimbursement (8.75%)
- Pharmacy information system usage and application (10%)
Qualitative and nonexperimental quantitative data from the learners was also collected via interview using open-ended discussion, Likert-style questions, and interview survey questions to gauge reaction to the course. In preparation, the researcher reviewed the standard level one reaction survey results, which all participants are required to complete within the curriculum, to help create focused interview questions. From this analysis, an interview guide was developed to direct the process. The goal of the interview was to use induction by recording several experiences with the course design to make a broader statement about the training program as a whole (Brinkmann, 2013).

The interview guide, found in Appendix A, was formulated based on the research questions of this study. The questions were presented in a language that could be easily understood and allow for elaboration by the interviewee to capture perceptions. The researcher also asked the interviewee for a specific, detailed narrative of their memory of their experience with the training program to help the participants improve the reporting of their memories (Brinkmann, 2013).

The Likert-style questions, which used a rating scale, were used to gather a quantitative score for questions rating aspects of the training program positively or negatively. The selected-response rating scale questions were utilized to increase consistency across respondents and allow for tabulation of quantitative data (Wiersma & Jurs, 2009). The open-ended questions were used to gather more creative, personal responses that could be analyzed for overall themes and provide support for the quantitative findings.

**Data Collection Procedures**

The existing survey and final assessment questions, as well as the interview questions were submitted to the University of Wisconsin-Stout’s Institutional Review Board (IRB). After
receiving approval, the researcher pulled the data for course completion and final assessment scores from the healthcare company’s learning management system (LMS). This historical quantitative data provided support for the research questions designed to examine completion rates and pass rates. A total of 451 participant records were analyzed, with 65 completing the course and providing survey data and final assessment scores.

The researcher met with a sample of 11 learners for over-the-phone interviews over a period of 14 days. An invitation to participate was sent to each participant (see Appendix B). The interviews were recorded and transcribed by the interviewer and saved in a Microsoft OneNote notebook. Interviews each lasted about 30 minutes. A follow-up letter was provided to learners to thank them for their participation (see Appendix C).

**Data Analysis**

Data analysis on the qualitative research collected from the interviews was analyzed by the researcher. An indicative research design was utilized to detect themes within answers from the interview questions. The answers, or data, were coded into similar themes and categories relevant to the research questions to help establish meaning for the patterns (Brinkmann, 2013). Like comments that appeared three or more times were considered a theme. These were analyzed alongside the quantitative data to help explain the overall experience that the participants in the study had.

The researcher utilized data-driven coding, in which the researcher started without codes, and developed them after reviewing the material transcribed from the interviews. This type of coding is a part of a research methodology called grounded theory, in which the researcher develops a theory as they review information and make assumptions inductively (Brinkmann,
The researcher broke down responses, compared, and categorized the data in a way that could help develop answers to the research questions.

The quantitative data was pulled from the healthcare company’s LMS, Cornerstone on Demand (CSOD). Descriptive statistical analysis was performed on the quantitative data, which included course completion rates and final assessment scores for the practice exam. Significant information, such as the mean test score for the practice exam, and mean test scores for the various sections of the exam were calculated.

**Limitations**

The following were the limitations of the study:

1. This study was limited to a sample of employees completing an in-house training program at one healthcare company. The findings of the study may not be relatable to other employers who utilize different tools and techniques in their technician training.

2. The healthcare company in this study focused primarily on insurance, although they do own several large mail order pharmacies. The findings of this study may not apply to companies whose focus is the retail or hospital business.

3. The research instruments, including the final knowledge assessment and interview guide, were developed by employees within the healthcare company. They are not necessarily validated instruments.

4. The researcher is employed with the healthcare company and is an instructional designer. The researcher may have some beliefs and perceptions about what the best design for the curriculum should be.
Summary

The purpose of this study was to investigate the influence of an in-house certification training on the pass rates of the pharmacy technician practice exam. The findings may be used to recommend further updates or identify training best practices in the industry. This chapter discussed the mixed-method research design, which included both qualitative and quantitative components. The subjects of the research, instrumentation used, data collection, data analysis techniques, and limitations of the study were also discussed. Chapter Four will discuss, in depth, the analysis of the data collected in this study.
Chapter IV: Results

The purpose of this study was to investigate the influence of a training program at a large healthcare company designed to prepare pharmacy technicians to take the Pharmacy Technician Certification Exam (PTCE), as well as gather the learners’ perceptions of the training. A mixed methodology was used for this study. Historical research was utilized to analyze existing quantitative data to review practice exam scores and successful completion rates of the current curriculum. Interviews were conducted with learners to gather additional data on their experience with the training program and usefulness of the course content and practice exam. The interview guide can be found in Appendix A. The specific research questions addressed in this study were:

1. What effect does offering the certification program in an eLearning format during normal work hours have on course completion rates and practice exam pass rates?
2. To what degree did offering the certification preparation program in an eLearning format with a practice exam prepare participants for the official PTCE exam?
3. What were the learners’ perceptions of the Tech Path to Certification training?

The findings of the interviews and quantitative data are detailed in this chapter. The demographics of the program participants will be discussed. Finally, the data for each research question will be discussed.

Demographics

This study focused on a group of employees within a large healthcare company that were enrolled in a specific pharmacy technician certification training. A report was pulled of all employees who had the Tech Path to Certification training appear on their online transcripts within the company’s learning management system. A group of 451 employees had the training
on their transcript. Of the 451 employees, 76 were no longer with the company. Although 451 employees were enrolled in the course, not all of them actively participated in the training. The transcript status, which indicates whether an employee has completed the training or is currently enrolled, was analyzed. Of the 451 participants, 377 learners were noted as In Progress, 65 had a transcript status of Completed, and nine had a transcript status of Past Due (see Figure 1).

Figure 1. Transcript status.

Interview respondents included a subset of the 65 participants who completed the Tech Path to Certification training. Of the 65 participants who completed the program, 11 were chosen randomly to participate in interviews. The 11 interview participants completed the training program between July 2018 and October 2019.

All of the participants worked for the same healthcare company in various locations across the United States, with a majority of participants located in Ohio, Arizona, and Texas. All of the participants had at least a high school diploma and were age 18 or older. Training participants came from various educational and work backgrounds.
Effect of Offering eLearning During Business Hours on Course Completion and Practice Exam Pass Rates

The first research question sought to determine what effect the eLearning format of the Tech Path to Certification program, which was offered during normal work hours, had on course completion rates, and practice exam pass rates. Reports were pulled to analyze course completion rates and practice exam data. A total of 451 learners had the Tech Path to Certification training on their transcript. Of these learners, 65 completed the course. The completion rate for those registered for the training at the time the report was pulled was 14.41%.

Practice exam scores for the course were analyzed. Of the 65 learners who completed the training course, 47 took the practice exam. In some instances, learners were able to take the practice exam more than once. An analysis of practice exam attempts per learner is presented in Figure 2. A majority of learners, 55%, took the exam once. Some learners, 19%, took the practice exam four or more times.

Figure 2. Test attempts per learner.
A passing score for the practice exam was 75 or higher. A total of 110 test scores were analyzed. These 110 test scores did include learners who took the practice exam more than once. The average score was 59%. Of the 110 scores, 19 were passing scores and 91 were failing scores (see Table 1).

Table 1

*Test Scores: Pass vs Fail*

<table>
<thead>
<tr>
<th>Pass or Fail</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail</td>
<td>91</td>
<td>82.7%</td>
</tr>
<tr>
<td>Pass</td>
<td>19</td>
<td>17.3%</td>
</tr>
</tbody>
</table>

A majority of the test scores (n = 71, 65%) fell between 51 and 74 (see Figure 3). There were a total of 19 passing scores, making the pass rate for the practice exam 17.3%.

*Figure 3. Practice exam scores.*

Another test analysis report was pulled to analyze the average score for the various sections of the practice exam. Learners performed best on the Pharmacy Quality Assurance section of the practice exam with an average score of 61% (see Table 2). Learners received the
lowest average score, just under 42%, on the Pharmacy Billing and Reimbursement and Medication Order Entry and Fill Process sections of the practice exam.

Table 2

_Average Practice Exam Test Scores by Section_

<table>
<thead>
<tr>
<th>Test Section</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 5: Pharmacy Quality Assurance</td>
<td>61.0%</td>
</tr>
<tr>
<td>Section 1: Pharmacology for Technicians</td>
<td>52.5%</td>
</tr>
<tr>
<td>Section 7: Pharmacy Inventory Management</td>
<td>51.0%</td>
</tr>
<tr>
<td>Section 2: Pharmacy Law and Regulations</td>
<td>50.6%</td>
</tr>
<tr>
<td>Section 4: Medication Safety</td>
<td>49.7%</td>
</tr>
<tr>
<td>Section 9: Pharmacy Information Systems Usage and Application</td>
<td>49.2%</td>
</tr>
<tr>
<td>Section 3: Sterile and Non-sterile Compounding</td>
<td>48.5%</td>
</tr>
<tr>
<td>Additional Questions</td>
<td>46.2%</td>
</tr>
<tr>
<td>Section 8: Pharmacy Billing and Reimbursement</td>
<td>41.7%</td>
</tr>
<tr>
<td>Section 6: Medication Order Entry and Fill Process</td>
<td>41.7%</td>
</tr>
</tbody>
</table>

The 11 participants who participated in the interview portion of this research were asked several questions about their ability to complete the eLearning course within their normal workday. All of the respondents indicated that they were provided time within their workday to complete the training (see Table 3).
Participants were also asked if the fact that the training was provided within normal work hours affected their decision to participate. Most of the respondents (n=8, 72.7%) indicated that it did not affect their decision to take the course (see Table 4).

Table 4

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
<td>27.3%</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>72.7%</td>
</tr>
</tbody>
</table>

Another interview question asked if the eLearning format affected the learner’s decision to take the course. Most of the respondents (n=8, 72.7%) indicated that it did not affect their decision to take the course (see Table 5). Several respondents commented that they would have preferred an instructor-led or classroom training.

Table 5

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
<td>27.3%</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>72.7%</td>
</tr>
</tbody>
</table>
Several interview questions focused on the effectiveness of the practice exam and the content of the eLearning course. A majority of respondents (n=7, 63.6%) did not pass the practice exam (see Table 6).

Table 6

*Did Learners Pass the Practice Exam?*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>36.4%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>63.6%</td>
</tr>
</tbody>
</table>

Additionally, learners were asked if the content on the practice exam reflected what they learned in the course. This is reported in Table 7. Most of the learners (n=9, 81.8%) indicated that the practice exam content was reflective of what they learned in the course.

Table 7

*Did Practice Exam Content Reflect What Was Learned in the Course?*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>81.8%</td>
</tr>
<tr>
<td>Somewhat</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Effect of eLearning on Preparation for PTCE**

The second research question sought to determine the effect of the eLearning course and practice exam on the participant’s preparedness for the official PTCE exam. Learners were asked how prepared they felt to take the PTCE after taking the practice exam. This data is reported in Table 8. Four respondents felt extremely unprepared or unprepared (n=2, 18.2% and n=2, 18.2% respectively). Six respondents (54.5%) felt prepared.
Table 8

*Perceived Level of How Well Practice Exam Prepared Learners for PTCE*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Unprepared</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Unprepared</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Neither/Nor</td>
<td>1</td>
<td>9.1%</td>
</tr>
<tr>
<td>Prepared</td>
<td>6</td>
<td>54.5%</td>
</tr>
<tr>
<td>Extremely Prepared</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Learners were also asked how prepared they felt to take the PTCE overall after completing the eLearning course. This data is reported in Table 9. Three respondents felt extremely unprepared or unprepared (n=2, 18.2% and n=1, 9.1% respectively). Three respondents answered that they felt neither unprepared nor prepared (27.2%) and five indicated that they felt prepared (45.5%).

Table 9

*Perceived Level of How Well eLearning Course Prepared Learners for PTCE*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Unprepared</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Unprepared</td>
<td>1</td>
<td>9.1%</td>
</tr>
<tr>
<td>Neither/Nor</td>
<td>3</td>
<td>27.3%</td>
</tr>
<tr>
<td>Prepared</td>
<td>5</td>
<td>45.5%</td>
</tr>
<tr>
<td>Extremely Prepared</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Some interview questions were intended only for learners who went on to take the official PTCE. Six of the learners interviewed took the PTCE (54.5%) (see Table 10).
Table 10

Did the Learner Take the PTCE?

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>54.5%</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>45.5%</td>
</tr>
</tbody>
</table>

These learners were asked if they felt the questions on the practice exam were similar to those that appeared on their PTCE (see Table 11). Of the respondents that took the test, five (83.3%) indicated that they felt the practice exam questions were similar to those on the PTCE.

Table 11

Did Learners Feel the Practice Exam Questions were Similar to PTCE Questions?

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>83.3%</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

Of the learners who completed the PTCE, five (83.3%) indicated that the content of the eLearning course was reflective of the content tested on the PTCE (see Table 12).

Table 12

Did PTCE Content Reflect What Was Learned in the Course?

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>83.3%</td>
</tr>
<tr>
<td>Somewhat</td>
<td>1</td>
<td>16.7%</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Of the learners who took the PTCE, four passed and two did not pass (66.7% and 33.3% respectively) (see Table 13).
Table 13

Did the Learner Pass the PTCE?

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>66.7%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Participants Perceptions of the Tech Path to Certification Training

The third research question sought to gather information on the training participant’s perceptions of the technician certification training program. Learners were asked why they chose to participate in the Tech Path to Certification training program. Most of the respondents (n=8, 72.7%) indicated that a PTCB certification was required for their role (see Table 14).

Table 14

<table>
<thead>
<tr>
<th>Why Learners Chose to Participate</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTCB Certification Required for Role</td>
<td>8</td>
<td>72.7%</td>
</tr>
<tr>
<td>Not Specified</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Self-Interest in Training Topic</td>
<td>1</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Learners were also asked what they liked and disliked about the training course. Responses were grouped into like themes and reported in Table 15 and Table 16. Like responses that occurred three or more times were considered a theme. Aspects that the learners liked about the training course included the ability to work at their own pace, and how the course was broken into several easy to follow lessons. An unfavorable aspect was that the course was overwhelming and/or included a lot of information. Many learners (n=4, 36.3%) indicated that there was nothing they disliked about the course.
### Table 15

*Aspects Learners Liked about the Course*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency (%)</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Convenience/Work at Own Pace       | 4 (30.8%)     | • “Umm, well, it kind of contradicts what I said about needing people interaction, but I liked that I could do it at my own pace. I like my own pace on things that are easy for me.”  
  • “I liked the convenience of it. You know, it was nice to be able to do it when I had time.”  
  • “I liked that it was at your own pace.”  
  • “I was able to do it on my own time.” |
| Broken into Small Lessons/Easy to Follow | 5 (38.5%)   | • “It was easy to follow. They have like six lessons, you know, then after each lesson there is a test, of course. Each lesson is pretty well explained. It helped break some of it down a little bit.”  
  • “It was easy to follow.”  
  • “I like how it did break it down into lessons instead of one lump sum.”   |
Table 16

Aspects Learners Disliked about the Course

<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency (%)</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Nothing                      | 4 (36.3%)     | • “I don’t think there was anything I disliked.”  
|                              |               | • “Nothing at all”  
|                              |               | • “Nothing.”  
|                              |               | • “Nothing, it was convenient, so it was good.”  
| Overwhelming/A lot of Information | 4 (36.3%)     | • “I would say that honestly, we do a great job as far as training, but a lot of people already worked retail pharmacy. It was a lot of information for me.”  
|                              |               | • “There was so much information, it was overwhelming.”  

• “Like I said, the separation of the lessons and the details that it gave you was helpful.”  
• “I liked the training because it was broken down into sections.”
Learners were asked if they felt engaged throughout the course. Most of the learners (n=9, 81.8%) indicated that they felt engaged (see Table 17).

Table 17

Engagement Throughout Course

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>81.8%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

Learners were also asked several questions specifically about the eLearning format of the course. A Likert-style question asked how effective or ineffective the self-paced eLearning format was at teaching topics presented in the training course. None of the learners indicated that the eLearning format was ineffective (see Table 18). Many of the learners indicated that the eLearning format was effective or highly effective (n=6, 54.5% and n=3, 27.3% respectively).
Table 18

*Perceived Effectiveness of eLearning Format in Teaching Topics*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Ineffective</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Ineffective</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Neither/Nor</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Effective</td>
<td>6</td>
<td>54.5%</td>
</tr>
<tr>
<td>Highly Effective</td>
<td>3</td>
<td>27.3%</td>
</tr>
</tbody>
</table>

Regarding the eLearning format, learners indicated that they liked the ability to work at their own pace (n=9, 52.9%) and that they could go back to review the material as needed (n=3, 17.6%) (see Table 19).

Table 19

*Aspects Learners Liked about eLearning Format*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency (%)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Rush/Complete at Own Pace</td>
<td>9 (52.9%)</td>
<td>• “I think there were other people around me doing the same training, and I got through a lot of the sections quicker at my own pace. It was nice not to have to wait on other people to finish.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “I could look at it on my own time, you know, and try to memorize all the information.”</td>
</tr>
<tr>
<td>Theme</td>
<td>Frequency (%)</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>I like the eLearning because</td>
<td></td>
<td>“I like the eLearning because you can go at your own pace. You’re not pressured into trying to finish and not grasping the concept.”</td>
</tr>
<tr>
<td>you can go at your own pace.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You’re not pressured into</td>
<td></td>
<td></td>
</tr>
<tr>
<td>trying to finish and not</td>
<td></td>
<td></td>
</tr>
<tr>
<td>grasping the concept.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I was able to do it in my</td>
<td></td>
<td>“I was able to do it in my downtime, on my own time, in between calls.”</td>
</tr>
<tr>
<td>downtime, on my own time, in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>between calls.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It was something I could</td>
<td></td>
<td>“It was something I could complete on my own time.”</td>
</tr>
<tr>
<td>complete on my own time.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You could do everything at</td>
<td></td>
<td>“You could do everything at your own pace, you didn’t have to worry if someone was more advanced in a subject than you were.”</td>
</tr>
<tr>
<td>your own pace, you didn’t</td>
<td></td>
<td></td>
</tr>
<tr>
<td>have to worry if someone was</td>
<td></td>
<td></td>
</tr>
<tr>
<td>more advanced in a subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>than you were.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>That I could take my time in</td>
<td></td>
<td>“That I could take my time in getting it done. There was no rush or anxiety in trying to complete it”</td>
</tr>
<tr>
<td>getting it done.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There was no rush or anxiety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in trying to complete it”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just that I could do it when</td>
<td></td>
<td>“Just that I could do it when I had the time”</td>
</tr>
<tr>
<td>I had the time”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just that you don’t feel</td>
<td></td>
<td>“Just that you don’t feel rushed. You don’t feel like you are on a time schedule.”</td>
</tr>
<tr>
<td>rushed. You don’t feel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>like you are on a time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>schedule.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Could Go Back to Review</td>
<td>3 (17.6%)</td>
<td>“I would say you can go back and review, even after you completed the practice test, in case you forgot something.”</td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>“If I needed to go back over something, obviously I could do that.”</td>
</tr>
</tbody>
</table>
An aspect that was unfavorable about the eLearning format was that there was no instructor to go to with questions (n=5, 45.5%) (see Table 20).

<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency (%)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>No One to Go to</td>
<td>5 (45.5%)</td>
<td>• “Some of the math questions we didn’t understand, and we didn’t have anyone to help us.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “There wasn’t anybody to ask questions to.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “The whole not having someone to ask questions to about anything. I like self-paced but that’s the only downfall. You don’t have anyone to reach out to if you don’t understand a question or if you want it explained differently.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “I would have liked the opportunity to ask questions to a trainer.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “I prefer to have a designated teacher that I could reach out to for questions.”</td>
</tr>
</tbody>
</table>
Theme | Frequency (%) | Comments
--- | --- | ---
No Dislikes | 5 (45.5%) | • “I don’t think there was anything I disliked.”
• “Nothing at all.”
• “Nothing.”
• “Nothing. It was convenient, so it was good.”
• “I like to learn at my own pace, so this format worked well for me.”

Learners were asked if there were any topics that were not covered in training (see Table 21). Most of the respondents (n=7, 63.6%) indicated that there were no topics left out of the training. Three learners indicated that there were topics not covered in training, but no specific examples could be recalled.

Table 21

*What Topics Were Not Covered in Training?*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>7</td>
<td>63.6%</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>27.3%</td>
</tr>
<tr>
<td>Hospital Topics</td>
<td>1</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Regarding the course content, learners were asked if they felt there were any topics that required more time and attention in the training. The reoccurring themes are summarized in Table 22. The most common theme reported was that math and the calculations associated with prescription compounding and IV prep required more time and attention (n=8, 53.3%).
<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency (%)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math/Compounding/IVs</td>
<td>8 (53.3%)</td>
<td>• “Most of it I knew except for the stupid math, and yes, I will call it stupid math.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Umm, I’m going to go back to the math, unfortunately. I went on Amazon and bought a book, Pharmaceutical Math for Dummies, to help me.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “The compounding sections. Compounding was a really hard section for me. I wanted more examples and more time with that section.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “I would say, to me, I’m average at math, but some of those formulas I had never seen in my life. It was challenging to figure out.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Some of the math questions and the laws.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “It was difficult for me to understand the IV part just because I never had to deal with it before. It was hard to understand the math on that part.”</td>
</tr>
<tr>
<td>Theme</td>
<td>Frequency (%)</td>
<td>Comments</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Myself, I think everyone is a little bit different, but I struggled with the compounding.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“The compounding, solutions, or mixing of drugs. I honestly still have no idea about that.”</td>
</tr>
<tr>
<td></td>
<td>3 (20.0%)</td>
<td>“I think it’s just an issue, in my opinion that the law is so hard to get down. The law is the worst part for me. It’s pretty impossible to remember them all, especially with so many different states, that makes it harder.”</td>
</tr>
<tr>
<td>Law</td>
<td></td>
<td>“I think the law requires a lot more time and attention.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Some of the math questions and the laws.”</td>
</tr>
</tbody>
</table>

**Summary**

The quantitative and qualitative data reported in this chapter was gathered to determine the effectiveness of the Tech Path to Certification training, as well as the learners’ perceptions of the program. Quantitative data from the healthcare company’s learning management system was pulled and reported. In addition, a group of 11 randomly selected employees who completed the
program were interviewed for this research. In this chapter, the findings of the interviews and quantitative data was detailed for each research question.

An indicative research design was utilized to detect themes within answers from the interview questions. Like comments that appeared three or more times were considered a theme and were reported in theme tables.

The researcher utilized data-driven coding, in which the researcher started without codes, and developed them after reviewing the data and material transcribed from the interviews. Using this grounded theory method, the researcher developed theories as the information was reviewed to make assumptions inductively (Brinkmann, 2013). The researcher broke down responses, compared, and categorized the data in a way that could help develop answers to the research questions.

The quantitative data of all employees who completed the Tech Path to Certification training revealed that pass rates for the practice exam were extremely low. Additionally, after analyzing the mean test score for each section of the practice exam, it was revealed that learners struggled most with subjects pertaining directly to the healthcare company’s business processes, including pharmacy billing and reimbursement and medication order entry and fill processes.

The interview data gathered from the 11 randomly selected learners revealed that neither the eLearning format, nor the offering of the program within their normal workday affected their decision to participate in the training. Overall, participants felt prepared to take the PTCE, and they reported that the lessons within the training were reflective of what appeared on the practice exam and the PTCE.

Using the quantitative data and interview responses, several themes surrounding the effectiveness of the training emerged:
• The eLearning format and course offering during normal work hours did not seem to be a factor in the learners’ choice to participate in the training.

• The eLearning format was perceived overall as effective and convenient in teaching the pharmacy technician certification topics.

• Although the eLearning was perceived as effective, the practice exam pass rates were extremely low.

• The training program provided a lot of information, which was overwhelming. Participants indicated a need to have a person or trainer to ask questions to.

• Learners felt that more time and attention should be spent on topics surrounding pharmacy math and pharmacy law.

Chapter V will include a discussion and analysis of these themes, as well as recommendations for updates to the training and further research required.
Chapter V: Discussion, Conclusion and Recommendation

Pharmacy technicians provide critical support to pharmacists in healthcare settings. Having adequately trained pharmacy technicians could help decrease major concerns for healthcare companies, which include dispensing errors and Health Insurance Portability and Accountability Act (HIPAA) violations. One way to reduce these errors is to require more stringent, standardized training and certification for pharmacy technicians (Manasse, 2007).

The Pharmacy Technician Certification Board (PTCB) has offered a standardized certification for pharmacy technicians over the last 25 years. Over the years, the PTCB certification has become recognized by many pharmacy employers and has been accepted as the national standard by more than half of the state boards of pharmacy in the United States (Muenzen, Corrigan, Smith, & Rodrigue, 2005).

The healthcare company in this study developed a certification program called Tech Path to Certification, as they were struggling with finding already qualified candidates in the market. The goal of this program was to offer entry-level employees the opportunity to take a class to prepare them to take the Pharmacy Technician Certification Exam (PTCE). After completing the course and passing the exam, technicians-in-training could earn their PTCB certification and be promoted to a pharmacy technician role.

Completion of the Tech Path to Certification program and pass rates of the PTCE are low for this healthcare company. The objective of this study was to analyze historical data on training program completion, practice exam pass rates, and to gather data through interviews on the learner perceptions of the Tech Path to Certification training. The study sought to answer the following research questions:
1. What effect does offering the certification program in an eLearning format during normal work hours have on course completion rates and practice exam pass rates?

2. To what degree did offering the certification preparation program in an eLearning format with a practice exam prepare participants for the official PTCE exam?

3. What were the learners’ perceptions of the Tech Path to Certification training?

In this chapter, discussion of the findings related to the research questions will be delivered. Conclusions and recommendations will be also be provided.

Discussion

The first research question sought to determine what effect the eLearning format of the Tech Path to Certification program, which was offered during normal work hours, had on course completion rates and practice exam pass rates. According to Hassan et al. (2013), employees may prefer on-the-job training as opposed to training outside of work hours. This was important to analyze, as companies that offer effective training opportunities have higher employee retention, which is a major concern in the healthcare industry (Nandan & Agrahari, 2018).

Learners that were interviewed were asked if they were allotted time within their normal workday to complete the training. All of those interviewed indicated that they were able to complete the training during their normal work hours. Learners were also asked if offering the course during their normal work hours or offering the course in an eLearning format affected their decision to participate. In both instances, 78.2% of those interviewed indicated that these factors did not affect their decision to participate in the training. This may have been due to the fact that for many roles within the healthcare company, a PTCB certification is required. Learners may have been required to complete the course to prepare for the PTCE no matter what
format or time the course was offered to keep the position they were hired for, or to obtain a promotion.

Reports were pulled to analyze course completion rates and practice exam data. The completion rate for those registered for the training at the time the report was pulled was a very low 14.41%. It is unknown why so many employees were registered for the program and did not complete the training. The training may have been assigned to every employee on certain teams or departments as a learning option. It is possible that only a small subset of employees were required to complete the program.

Practice exam scores for the course were also analyzed. The NABP recognizes that pharmacy technicians who obtain PTCB certification can perform their technician duties safely and effectively (Muenzen et al., 2005). Because the practice exam for this training is modeled specifically after the PTCE, it was important to analyze the test scores. In some cases, learners took the practice exam more than once. A majority of learners, 55%, took the exam once. Some learners, 19%, took the practice exam four or more times. Of all the practice exam scores, only 17.3% were passing. According to the PTCB (2018), the overall pass rate for the PTCE in 2018 was 57%. Relative to the PTCE exam, the pass rate for the healthcare company’s practice exam was extremely low. It is unknown why there is such a large difference in practice exam pass rates and PTCE pass rates, or if the eLearning format of the course contributes to the low pass rate.

Another test analysis report was pulled to analyze the average score for the various sections of the practice exam. Learners received the lowest average score, just under 42%, on the Pharmacy Billing and Reimbursement and Medication Order Entry and Fill Process sections of the practice exam. This is concerning, as the healthcare company relies on pharmacy
technicians to complete these specific pharmacy functions most often. A quality, well-trained pharmacy workforce is essential as dispensing errors, billing errors, and other violations are a major concern for the company in this study, as well as other healthcare industries (Manasse, 2007).

The second research question sought to determine the effect of the eLearning course and practice exam on the participant’s preparedness for the official PTCE exam. Learners were asked to rate on a scale of extremely unprepared to extremely prepared how ready they felt to take the PTCE after taking the practice exam. Over half of the respondents felt prepared. Learners were also asked, using the same scale, how prepared they felt to take the PTCE after completing the eLearning portion of the course. Just under half, 45%, felt prepared. Additionally, most learners reported that the practice exam questions were similar to the PTCE questions. They also indicated that what they learned in the eLearning module was reflective of the questions that appeared on the PTCE.

The final research question sought to determine the perceptions of the training participants. The learners were asked several questions to gather perceptions of the Tech Path to Certification program. Learners felt that the course was convenient, and they were able to work at their own pace without feeling rushed. They also liked the format of the course, which was broken down into sections that were easy to follow. Learners also indicated that they liked the ability to go back and review content that they needed to spend more time on. Overall, learners indicated that the course kept them engaged.

Participants did not like that there was no instructor or other dedicated person to go to for questions throughout the course. They also reported that the training contained a lot of
information and could be overwhelming. Several of the learners, however, reported no dislikes about the course.

All of the learners interviewed were asked if they felt there were topics that required more time or attention. The two common themes included content focused on math, compounding, and IVs, and pharmacy law content. Math was grouped with compounding and IVs as the content in all of these subjects required knowledge of dosing calculations and fractions. This is important to note, as the pharmacy technician role has shifted to more technical, skilled responsibilities, such as mixing compound medications (Alkhateed et al., 2011).

Conclusions

Little data exists on training pharmacy technicians, or in-house training programs offered by healthcare employers. The purpose of this study was to analyze an in-house training program provided by a large healthcare company, and develop conclusions and recommendations based on the data.

The first conclusion reached surrounds the effect of the eLearning program offered during work hours on successful training program completion. Participants indicated that neither the eLearning option nor the time offering of the course during the normal workday affected their decision to participate in the course. The course completion rates, and practice exam pass rates were both very low for the training program. It can be concluded that the eLearning program is not producing desirable program completion rates and practice exam scores. It is not known which variable should be modified to produce more desirable results. Variables could include the course design, course delivery method, learner interaction, training length, and/or
content presented within the course. Individual learning style could also influence the effectiveness of the training program.

The second conclusion reached surrounds how well the eLearning program and practice exam prepared learners to take the PTCE. Learners indicated that the practice exam and training content was reflective of the questions on the PTCE. Learners also indicated that their perceived level or preparation for the PTCE was overall “prepared” after completing the training program and practice exam. This indicates that the information contained within the training is reflective of the PTCE and has the potential to adequately prepare learners to pass the exam. Of those interviewed who completed the training program and went on to take the PTCE, over 60% passed the exam. This aligns with the 2018 PTCE pass rate of 57% (PTCB, 2017a).

The third conclusion reached concerns the participants’ perceptions of the eLearning format of the course. Overall, the interview participants indicated that eLearning was an effective method of teaching topics that appeared on the practice exam and PTCE. However, the practice exam pass rates were low, and respondents also indicated that they felt “information overload”. Many learners indicated that they would have preferred a person to go to throughout training for questions. This indicates that a blended learning approach may be more desirable. In blended learning, participants can complete some of the course content through eLearning, then have debrief sessions with an instructor to go over confusing material in more detail and ask questions. This aligns with the research study completed by Jacot et al. (2014) which concluded that due to the complex nature of some healthcare topics, trainers could spend more time on complex topics through face-to-face lecture if learners were exposed to basic knowledge through eLearning (Jacot, Noren, & Berge, 2014).
The final conclusion reached surrounds the content of the training. Most participants indicated that there were no subjects left out of the training based on the practice exam and official PTCE content. However, learners did indicate that there were several areas that could use more time and attention. These subjects included pharmacy math and pharmacy law. This indicates that the core content of the training aligns with what learners are tested on within the PTCE, but learners could require more focus on these more complex areas.

**Recommendations from the Research**

The results of this research indicate that the current training program may require enhancements to produce more desirable results for the healthcare company. Although interview data suggested that learners felt prepared to take the PTCE, liked the eLearning format, and felt the base content of the course was reflective of what is tested on the PTCE, practice exam scores remained extremely low. Possibilities for enhancing or re-designing the course could include:

1. Adding additional information and examples surrounding math, compounding, IVs, and pharmacy law to the current eLearning course. In addition, a trainer or dedicated subject matter expert could be available to answer questions as learners are progressing through the course at their own pace.

2. Re-designing the course as a blended learning option. Learners indicated that they liked how the course was segmented into smaller lessons. In a blended learning course, learners could complete a lesson, then go to a virtual or in-person instructor-led training to review, debrief, and ask questions. This option has the additional benefit of having a trainer to observe and report learner struggles and preparedness for the PTCE.
**Recommendations for Future Research**

Additional questions surfaced based on this research. The following are recommendations for future research:

1. Program completion rates for this study were very low. Out of 451 employees, only 65 completed the training program. Additional research to understand why so many employees were enrolled in the program to begin with, and how many employees were hired with the requirement to obtain their PTCB certification could be beneficial to understand the low completion rate.

2. The practice exam scores for the Tech Path to Certification course were low as well. Of all the practice exam scores, 82.7% were failing scores. Additional research to understand what learners are struggling with specifically on the test and to analyze other barriers could help improve course content, question wording, or other aspects of the course.

3. Lastly, to obtain a better measurement of how this training is performing, a test group of participants could be more carefully assessed. In future research, a pre-test and post-test could be administered to learners to measure knowledge gained throughout the course.
References


Appendix A: Interview Guide

Introduction

Thank you for participating in this interview today. My name is Alyssa, and I am completing graduate research on how the pharmacy technician certification training is perceived and experienced by learners. In addition, I would like to gather information on the effectiveness of the eLearning course design and practice exam, and how well these aspects prepared you for the Pharmacy Technician Certification Exam (PTCE).

As I mentioned in the invitation, I will not be collecting any personal identifiers. Your answers will remain confidential. You do not have to answer a question if you choose not to. The interview will be recorded and should take about 30 minutes. At the end of the interview, I will allow time for your questions or final comments.

Before we begin, do you have any questions?

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Interview Questions</th>
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| What were the learners’ perceptions of the Tech Path to Certification training? | 1. Tell me about your experience with the Tech Path to Certification training?  
- When did you participate in the course?  
- Why did you choose to participate?  
2. What did you like about the course?  
- Why did you like this aspect?  
3. What did you dislike about the course?  
- Why did you dislike this aspect? |
1. To what extent was the eLearning format effective or ineffective in teaching topics that appeared on the practice exam? Answer using the following scale:
   i. Highly ineffective
   ii. Ineffective
   iii. Neither ineffective nor effective
   iv. Effective
   v. Highly effective

2. What did you like about the self-paced eLearning format?

3. What did you dislike about the self-paced eLearning format?

4. Were you provided time within your normal workday to complete the Tech Path to Certification training?
   - If yes, did the option to complete this training during your workday affect your decision to participate in the course?

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| **What effect does offering the certification program in an eLearning format during normal work hours, have on course completion rates and practice exam pass rates?** | **4. Did you feel engaged throughout the course?**  
  - Why or why not?  

**5. Did you have any questions or concerns after completing the course?** |
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>1. To what extent did the eLearning format of the course adequately prepare you for the PTCE?</td>
<td>Answer using the following scale:</td>
</tr>
<tr>
<td></td>
<td>i. Extremely unprepared</td>
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<tr>
<td></td>
<td>ii. Unprepared</td>
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<tr>
<td></td>
<td>iii. Neither unprepared nor prepared</td>
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<tr>
<td></td>
<td>iv. Prepared</td>
</tr>
<tr>
<td></td>
<td>v. Extremely prepared</td>
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<tr>
<td>2. Tell me more about why you felt unprepared/prepared?</td>
<td></td>
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<tr>
<td>3. How well did the practice exam prepare you for the PTCE?</td>
<td>Answer using the following scale:</td>
</tr>
<tr>
<td></td>
<td>i. Extremely unprepared</td>
</tr>
<tr>
<td></td>
<td>ii. Unprepared</td>
</tr>
<tr>
<td></td>
<td>iii. Neither unprepared nor prepared</td>
</tr>
<tr>
<td></td>
<td>iv. Prepared</td>
</tr>
<tr>
<td></td>
<td>v. Extremely prepared</td>
</tr>
</tbody>
</table>

To what degree did offering the certification preparation program in an eLearning format with a practice exam prepare participants for the official PTCE exam?

- If no, when did you complete this training?
- Were you reimbursed or paid for your time?

5. Did the self-paced eLearning option affect your decision to participate in the course?
- Why or why not?

6. Did you pass the practice exam?
4. How similar was the practice exam to the official PTCE?
   - What similarities or differences did you notice?

5. Did the practice exam content reflect what you learned?
   - If no, what topics were not covered in training?

6. Did the official PTCE content reflect what you learned?
   - If no, what topics were not covered in training?

7. Were there any topics that you felt required more time and attention?

8. Did you go on to take the PTCE?
   - If no, why did you not complete the PTCE?

9. Did you pass the PTCE?

### Closing

Is there anything else you would like to discuss about the training?

Do you have any final questions?

Thank you for your time and participation.
Appendix B: Invitation to Participate

Dear (Learner),

I am conducting interviews as part of my graduate research study to increase the understanding of how the pharmacy technician certification training is perceived and experienced by learners. In addition, I would like to gather information on the effectiveness of the eLearning course design and practice exam, and how well these aspects prepared you for the Pharmacy Technician Certification Exam (PTCE). I am looking to gather opinions and information on the Tech Path to Certification training that you completed through Cornerstone on Demand. The interview will take around 30 minutes.

Your responses to the questions will be kept confidential. Each interview will be assigned a number code to help ensure that personal identifiers are not revealed during the analysis and write up of findings. Your participation will be a valuable addition to my research, and findings could lead to greater public understanding of pharmacy technician training in the healthcare field. The learning and performance team may also use this information to improve the pharmacy technician certification training.

If you are willing to participate, please accept this meeting invitation, or reply with a proposed day and time that fits your schedule. I will do my best to be available. Please review the informed consent form attached to this invitation. If you have any questions, please do not hesitate to ask.

Thank you!
Appendix C: Thank You for Participation Letter

Dear (Learner),

I want to thank you again for taking the time to discuss your experiences with the Tech Path to Certification training program with me. I realize that participating in this interview took time from your workday, and I value the time that you committed to my research efforts. I truly value the information that you provided.

You were one of 11 interview participants throughout our organization. With your help, I will be able to make recommendations to improve the pharmacy technician certification training. This study will also help contribute to the body of research surrounding training and development for healthcare professionals, specifically, pharmacy technicians. Should you have any additional questions or comments, do not hesitate to contact me.

Thank you again for your time and participation.
Appendix D: Implied Consent Form

UW-Stout Implied Consent Statement for Research Involving Human Subjects

Consent to Participate In UW-Stout Approved Research Project
Title: Analysis of the Influence of an In-House Certification Program on the Development of Pharmacy Technicians in a Large Healthcare Company

Description: I am completing graduate research on how the pharmacy technician certification training is perceived and experienced by learners. I am gathering information on the effectiveness of the eLearning course design and practice exam, and how well these aspects prepared learners for the Pharmacy Technician Certification Exam (PTCE) and their role as a pharmacy technician. Participants will take part in an interview about their views on the training program, and whether they felt it prepared them to take the Pharmacy Technician Certification Board practice exam and official PTCE.

Risks: You may be asked questions about your personal opinions and beliefs. Some of the questions may cause discomfort. You do not need to answer these questions should you choose not to. There is a chance that your answers could be seen by someone who should not have access to it. I am minimizing this risk by removing all personal identifiers. No names or identifying information will be shared as a part of this study.

Benefits: You may benefit by contributing to our understanding of the Tech Path to Certification training program and its effectiveness on preparing learners to complete the PTCE. This could provide insights to improve our training practices and/or lead to future research. This research may also contribute to the body of knowledge surrounding pharmacy technician training in the healthcare industry.

Confidentiality: No names or identifying information will be collected or published as a part of this study. Your name and any information regarding the study will be stored in the researcher’s computer and will be permanently deleted once the Fall 2019 semester ends.

Future Use: Any information collected for this research project will be stripped of identifiers. The results may be used to improve the pharmacy technician training program. It may also be used in future research surrounding the training of pharmacy technicians in the healthcare industry.

Time Commitment: The standard interview will likely take about 30 minutes.
Right to Withdraw:  
Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. You have the right to stop the interview at any time. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document after it has been turned into the researcher.

IRB Approval:  This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study, please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator: Alyssa Haynes
IRB Administrator  
Elizabeth Buchanan  
Office of Research and Sponsored Programs  
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UW-Stout  
Menomonie, WI 54751  
715.232.2477  
Buchanane@uwstout.edu

Advisor: Debbie Stanislawski

Statement of Consent: By accepting the WebEx meeting invitation and completing the following interview, you agree to participate in the project entitled, Analysis of the Influence of an In-House Certification Program on the Development of Pharmacy Technicians in a Large Healthcare Company.