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Brooks, Reed G. ***Factors Impacting Clinical Laboratory Science Program Directors' Decision to Use Distance Education***

Abstract

Hospitals are experiencing a labor shortage of qualified laboratory professionals. Multiple problems have contributed to this issue including a reduction in the number of clinical laboratory science programs nationwide. One way to address the shortage is by increasing the number of distance programs within the clinical laboratory sciences. The purpose of this study was to examine motivating and inhibiting factors impacting clinical laboratory science program directors' decision to use distance education. Of 467 clinical laboratory science program directors listed on a national registry, 163 responded to an online survey utilizing a four-point Likert scale. Results indicated directors are motivated by intrinsic factors centered around the concept of flexibility. Directors with distance education experience were intrinsically motivated by students-centered factors, while directors without experience were intrinsically motivated by personal-centered factors. Several significant differences existed between group comparisons of inhibitors for directors with and without experience and when divided into programmatic setting creating three groups: medical laboratory science program directors in university settings, medical laboratory technician program directors in technical college settings, and hospital-based program directors. Directors without experience and those hospital-based found more factors to be inhibiting.

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Chapter I: Introduction

Urban and rural hospitals are experiencing a shortage of qualified laboratory professionals (American Society for Clinical Pathology, 2004; Carden, Allsbrook & Thomas, 2009; Doby, 2016; Garcia, Ali, Soles, & Lewis, 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011). This shortage within the clinical laboratory sciences includes bachelor's level trained Medical Laboratory Scientist(s) (MLS), also commonly referred to as Medical Technologists or Clinical Laboratory Scientists, and associate's level trained Medical Laboratory Technician(s) (MLT) also referred to as Clinical Laboratory Technicians (Bureau of Labor Statistics, 2017; Carden et al., 2009). For clarity and simplicity purposes, the abbreviations MLS and MLT are used throughout the remainder of this text to refer to laboratory personnel pertinent to this study (see Table 1).

An aging population requiring increased medical care, an increased number of baby boomers' set to retire from the profession, and fewer individuals pursuing degrees in the clinical laboratory sciences are all contributing to the labor shortage of laboratory professionals (American Society for Clinical Pathology, 2004; Bureau of Labor Statistics, 2017; Carden et al., 2009; Doby, 2016; Kaplan & Burgess, 2011; Scott, 2015). Approximately 67 percent of clinical laboratory science programs closed between 1975 and 2005; resulting in a 66 percent decrease in the number of available graduates (Carden et al., 2009). Workforce shortages have been especially impactful on rural areas (American Society for Clinical Pathology, 2004; Doby, 2016; Szabo, 2011).

The United States Bureau of Labor Statistics (2017) projected a 13 percent increase in the number of jobs available for MLS and MLT professionals between 2016 and 2026; a growth rate deemed faster than average. The question arises: "will there be enough qualified individuals to

fill the projected need?" Clinical pathology laboratories have experienced rapid increases in automation effectively reducing the number of skilled laboratorians required to complete diagnostic testing of patient samples, which may lessen the impact of the shortage (Ledeboer & Dallas, 2014). Critics argue automation will not completely alleviate the current national shrotage (Zaleski, 2011).

Table 1

Common Professional Abbreviations, Synonyms and Typical Level of Degree Attainment of Pertinent Clinical Laboratory Science Professionals

Name	Abbreviation	Synonyms	Typical Degree Level
Medical Laboratory Scientist	MLS	Medical Technologist, Clinical Laboratory Scientist	Bachelor's
Medical Technologist	MT	Medical Laboratory Scientist, Clinical Laboratory Scientist	Bachelor's
Clinical Laboratory Scientist	CLS	Medical Laboratory Scientist, Medical Technologist	Bachelor's
Medical Laboratory Technician	MLT	Clinical Laboratory Technician	Associate's
Clinical Laboratory Technician	CLT	Medical Laboratory Technician	Associate's

Statement of the Problem

The number of clinical laboratory science programs training potential MLS and MLT students nationwide has been on the decline (Carden et al., 2009). Only a small percentage of those still in existence are recognized as distance programs (American Society for Clinical Laboratory Science, 2017a, 2017b). One way to address the shortage of and projected rapid growth rate for laboratory professional positions is by increasing the use of distance education.

Research examining distance education utilization in clinical laboratory science programs is limited. For the purpose of this research, distance education encompasses fully online and hybrid courses and/or programs (Higher Learning Commission, 2017). Distance education can provide students in rural areas the opportunity to access and pursue education or careers that otherwise may not be available. Distance programs can also benefit non-traditional students' unable to attend traditional classes who in the clinical laboratory sciences tend to be older than their traditional counterparts (Hansen-Suchy, 2011; Russell et al., 2007). The number of distance education MLS and MLT programs in the U.S. has been increasing. However, the number of such programs is relatively low in relation to the number of traditional programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017).

Critics of online education. Nationwide, the number of online programs has exponentially increased along with the number of students enrolling in them (Allen & Seaman, 2013, 2015). This trend is also notable within allied health science disciplines (Williams, 2006). Critics of distance education argue the quality of online education is substandard and/or that instructional design is lacking as compared to traditional courses/programs (Bejerano, 2008; Margaryan, Bianco, & Littlejohn, 2015). Nationally, faculty are experiencing increased workloads (Gous & Roberts, 2015; Jacobs, 2004; Mamiseishvili, 2012; Montero-Hernandez, Levin & Diaz-Castillo, 2014) making it difficult for educators to have the time for thoughtful instructional design and implementation of quality online programs. This may be especially true for educators in the allied health sciences including the clinical laboratory sciences where educators are required to complete continuing medical education to maintain licensure/certification (National Accrediting Agency for Clinical Laboratory Sciences, 2013). Clinical laboratory science program directors and educators are often responsible for site visits,

the creation and maintenance of articulation agreements, and clinical practicum placements all of which are time consuming.

Research indicates laboratory managers/supervisors with little to no direct experience with distance education programs have negative perceptions of online-trained clinical laboratory science professionals, whom administrators believe are lacking in practical hands-on-training (Perry, 2014). However, research identified found no significant differences exist between the academic performance of traditionally trained versus distance trained clinical laboratory science students in cumulative grade point averages or board certification scores (Hansen-Such, 2011; Russel et al., 2007).

Clinical laboratory science online programs. The overall number of accredited clinical laboratory science programs has steadily declined since the early 1990s contributing to the labor shortage (American Society for Clinical Pathology, 2004; Carden et al., 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011). At the time of this writing, there were 22 accredited online undergraduate MLS programs, 16 online MLT programs, and 23 online MLT to MLS completion programs in the U.S. (American Society for Clinical Laboratory Science, 2017a, 2017b). The number of online programs in the clinical laboratory sciences has increased; however, the overall number of online programs is relatively small compared to the number of accredited programs nationwide on a national registry: 233 MLS programs, and 239 MLT programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017a).

Distance education programs could provide a solution for reducing workforce labor shortages. A limited amount of research exists regarding clinical laboratory science program directors' and educators' experiences with distance education (Esani, 2010; Freeman, 2010;

Hammerling, 2012; Hansen-Suchy, 2011; McCown, 2010; Veldkamp, 2013). No research was identified specifically addressing motivating and inhibitory factors impacting clinical laboratory science program directors' decision to use distance education as a means to deliver education to address workforce shortages.

Purpose of the Study

Traditional clinical laboratory science programs have been steadily declining (American Society for Clinical Pathology, 2004; Carden et al., 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011). Existing clinical laboratory science programs nationwide have the opportunity to increase their online course/program offerings to help fill this void. The purpose of this study was to examine both motivating and inhibiting factors impacting clinical laboratory science program directors' use of distance education for course or program delivery at accredited MLS and MLT programs nationwide.

Similar studies have examined motivators and/or barriers faced by faculty at individual institutions or related allied health fields in relation to distance education participation (Betts, 1998; Betts, 2014; Betts & Heaston, 2014; Cook, Ley, Crawford, & Warner, 2009; Kowalczyk, 2014); however, none specifically studied the clinical laboratory sciences. The goal of this research was to address the gap in the scientific literature examining such motivating and inhibiting factors for clinical laboratory science program directors in their decision to use distance education.

Research Questions

The research questions developed for this study were grounded in Deci and Ryan's (1985) and Ryan and Deci's (2017) Self Determination Theory of motivation. The research questions include:

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?
2. What factors inhibit clinical laboratory science program directors from using distance education?
3. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience?
4. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings?

Identifying such factors could provide useful information for clinical laboratory science programs transitioning to or considering a transition to distance programs. The number of online programs and online students in the U.S. continues increasing (Allen & Seaman, 2013, 2015). Related allied health programs including speech language pathology, occupational therapy, physical therapy, and clinical psychology have experienced such increases with success (Williams, 2006). Limited data exists, however, examining distance education clinical laboratory science programs (Esani, 2010; Freeman, 2010; Hammerling, 2012; Hansen-Suchy, 2011; McCown, 2010; Veldkamp, 2013). A better understanding of motivating and inhibitory factors

impacting clinical laboratory science program directors' participation in distance education could help address the labor shortage of qualified MLS and MLT professionals.

Significance of the Study

The findings of this study could provide insight into the factors impacting clinical laboratory science program directors' and educators' decision to use distance education. More specifically, the data can provide insight into what motivating and inhibiting factors impact those already involved in distance education, those considering transitioning to using distance education, and those who have not really considered distance education. Findings could also impact the declining numbers of clinical laboratory science programs by providing information about the use of distance education within MLS and MLT programs. Distance education can help address the labor shortage of clinical laboratory science professionals by offering additional opportunities for education for non-traditional students via increased access to education.

Assumptions of the Study

The study assumed respondents interpreted the questions and directions clearly while answering honestly. The study also assumed the sample obtained was representative of the larger clinical laboratory science population of program directors listed on a national registry for MLS and MLT programs. The study also assumes respondents only completed the survey once.

Limitations of the Study

The study was quantitative in nature and used a questionnaire primarily comprised of Likert-scaled questions. The instrument initially created by Betts (1998) and later modified by Betts (2014), which served as the basis for the questionnaire used in this study, utilized a five-point Likert scale. The research committee requested the number of available responses be

reduced from five to four eliminating 'neutral' responses driving respondents to decide agreement or disagreement for this study.

Responses were via self-report, which is a recognized limitation (Bourque & Fielder, 1995). In addition, response rates of surveys tend to be low; another potential limitation (Wiersma & Jurs, 2009). The study population consisted of program directors of MLS and MLT programs in the U.S. listed on the National Accrediting Agency for the Clinical Laboratory Sciences (NAACLS, 2017a) website. This study attempted a census by sending the questionnaire to all members of the study population. The sample obtained was random in that all members of the population had an equal chance of being included (Patten, 2009), but participation was voluntary. Program directors who chose to respond to the survey were in fact volunteering to do so and this could create sampling bias, a recognized weakness (Patten, 2009; Wiersma & Jurs, 2009). In addition, the individuals identified on the NAACLS website serve as program directors, and may not represent the larger population of clinical laboratory science educators not serving as program directors throughout the nation.

List of Abbreviations and Definition of Terms

Healthcare has its own language: medical terminology. With this language comes a multitude of technical terms, acronyms, and abbreviations. Below is a list of common terms, abbreviations, and acronyms utilized throughout this study.

American Society for Clinical Laboratory Science (ASCLS). A professional organization for clinical laboratory science professionals offering continuing education opportunities (http://www.ascls.org/).

American Society for Clinical Pathology (ASCP). The premier certification body for laboratory professionals in the U.S. (https://www.ascp.org/content).

Apprenticeship. A position in which one learns a trade under the tutelage of another (Apprenticeship, n.d.).

Articulation agreements. "Mutual promises of cooperation for particular programmatic purposes to provide program access at whatever location through a pattern of normal transferability of students from one institution to another, without dual enrollment status that is formally recognized or requires any special treatment" (Michigan State University, 2013, p.1).

Clinical laboratory sciences. The Clinical Laboratory Sciences are a diverse field of laboratory educational programs. Accredited programs by the National Accrediting Agency for Clinical Laboratory Sciences include but are not limited to MT/MLS, MLT, histotechnologists, and cytotechnologists. The field prepares students to become competent laboratory professionals capable of performing various complex tasks in hospital laboratories in a variety of specialties including, but not limited to blood banking, hematology, clinical chemistry, and microbiology (National Accrediting Agency for Clinical Laboratory Sciences, 2017b).

Clinical laboratory science educator. A working definition of clinical laboratory science educators are those faculty, administrators, directors, advisors or other individuals involved in clinical laboratory science education for MLS and MLT students in both academic and hospital settings (http://www.ascls.org/ascls-meetings/clinical-laboratory-educators-conference).

Clinical laboratory science program director. A working definition of a program director is one who is a certified medical laboratory professional with at least a master's degree, and with at least three years of teaching experience ((National Accrediting Agency for Clinical Laboratory Sciences, 2017b).

Clinical laboratory scientist (CLS). The term is another name for medical laboratory scientists also known as medical technologists (Bureau of Labor Statistics, 2017).

Diagnostics. Refers to methods/professions used to identify or produce a diagnosis such as MLS and MLT (Diagnostics, n.d.).

Distance education. The term distance education was used in a general sense to encompass fully online and hybrid courses and/or programs. Distance Education is defined as using one or multiple technologies such as the internet, one-way or two-way transmissions via open broadcasts, closed circuit, cable, microwave, broadband lines, fiber optics, satellite or wireless communication devices, and/or audio conferencing to provide substantive, synchronous or asynchronous interaction between instructors and students separated in space (Higher Learning Commission, 2017).

Extrinsic motivation. One's desire to participate in a given activity for reasons other than the enjoyment of the activity itself (Deci & Ryan, 1985). Possible rewards for involvement include social status, money, prestige, etc. (Betts, 1998).

Fully online courses. Courses where 80-100 percent of content is delivered online (Allen & Seaman, 2015).

Hybrid courses. Courses where 30-79 percent of content is delivered online (Allen & Seaman, 2015).

Intrinsic motivation. One's desire to participate in an activity where the reward is the activity itself not some external source/factor such as money, prestige, etc. (Betts, 1998; Deci & Ryan, 1985). Intrinsic motivation results from curiosity, challenge, or inherent satisfaction with the activity itself (Betts, 1998; Deci & Ryan, 1985).

Medical laboratory scientist (MLS). Clinical laboratory professionals typically with a four-year bachelor's degree in the clinical laboratory/medical laboratory sciences (Carden et al., 2009).

Medical laboratory technician (MLT). Typically two-year trained laboratory professionals often with an associate's degree in the clinical laboratory/medical laboratory sciences (Carden et al., 2009).

Medical technologists (MT). Another name for a medical laboratory scientist/clinical laboratory scientist (Carden et al., 2009)

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). The premiere accrediting body for clinical laboratory science programs in the U.S. including MLS and MLT programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017b).

Practicum. An educational experience in a supervised practical setting where an individual applies theory to practical applications (Practicum, n.d.).

Therapeutics. Branch of medicine composed of various healthcare professionals that employ remedies for disease (Therapeutics, n.d.).

Web facilitated courses. Courses where only 1-29 percent of content is delivered online, essentially a face-to-face course that uses a learning management system for posting syllabi and assignments (Allen & Seaman, 2015).

Traditional courses. Courses where zero percent of content is delivered online (Allen & Seaman, 2015).

Chapter II: Literature Review

The clinical laboratory sciences consist of a diverse field of educational programs and laboratory professionals including MLS and MLT (National Accrediting Agency for Clinical Laboratory Sciences, 2017). A national labor shortage of qualified MLS and MLT professionals exists for various reasons including a lack of recruitment, increased retirements, negative perceptions and/or lack of knowledge of the field, and increased demand for laboratory services (American Society for Clinical Pathology, 2004; Carden et al., 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011).

Increasing the number of students graduating from clinical laboratory science programs is one solution to resolving the labor shortage. However, maintenance of educational quality is necessary for a profession which directly impacts patient health. Ways to increase the number of graduates include increasing the number of programs, and by transitioning traditional programs and/or curriculum to distance education platforms for delivery. Distance education programs are capable of reaching students in remote geographic locations and non-traditional students, which traditional programs may not. Transitioning to distance education for academic delivery may not come easily for educators in a profession requiring extensive practical training (National Accrediting Agency for Clinical Laboratory Sciences, 2013).

The purpose of this study was to explore motivating and inhibiting factors impacting MLS and MLT program directors' decision to incorporate distance education for the delivery of academic programs and/or courses. Distance education encompasses both fully online and hybrid courses where instructors and students are separated by space, but connect via a myriad of information technologies in a synchronous or asynchronous fashion (Betts, 1998; Higher Learning Commission, 2017). This manuscript will use definitions of online, hybrid, web

facilitated, and traditional courses as defined by the Higher Learning Commission (2017). The goal of this study was to address the gap in the scientific literature examining motivating and inhibiting factors facing clinical laboratory science program directors while considering using distance education for academic program/course delivery.

Research Questions

The research questions developed to help drive this process are grounded in Deci and Ryan's (1985), and Ryan and Deci's (2017) Self-Determination theory of motivation:

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?
2. What factors inhibit clinical laboratory science program directors from using distance education?
3. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience?
4. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings?

Clinical Laboratory Science Professional Overview

The job growth outlook for both MLS and MLT is growing faster than normal compared to other occupations at 12 percent and 14 percent respectively between 2016 to 2026 (Bureau of Labor Statistics, 2017). According to the BLS (2017) there were 171,400 MLS and 164, 200 MLT employed in the U.S. in 2016. The majority of MLS and MLT professionals were

employed in hospitals: 57 percent and 43 percent respectively (Bureau of Labor Statistics, 2017). The number of MLS and MLT working as educators was six percent in 2016 (Bureau of Labor Statistics, 2017).

Accredited MLS and MLT programs need to meet rigorous academic standards regulated by NAACLS (2017b) regarding curriculum, program administration, and faculty. Both MLS and MLT program directors are required to have at least a master's degree, and certification by the American Society for Clinical Pathology (ASCP) as a MLS generalist. The accrediting body requires didactic content areas including foundational courses in biology, chemistry and mathematics. Program specific courses for both MLS and MLT are rigorous and must include clinical chemistry, hematology/hemostasis, immunology, immunohematology/transfusion medicine, microbiology, urine and body fluid analysis, and laboratory operations (National Accrediting Agency for Clinical Laboratory Sciences, 2017b). Programs typically provide hands on practical training in the form of laboratories to reinforce didactic lectures in academic settings, and direct clinical experience in the form of clinical practicums. Upon successful completion of a MLS or MLT program, students are able to complete the ASCP Board of Certification examination. Many employers may not require certification immediately upon hire, but continued employment is often contingent upon successful completion of the exam within specified timeframes.

Medical laboratory scientists and MLT are often employed in state, local, and/or private hospitals followed by diagnostic laboratories, physician's offices and academic institutions (Bureau of Labor Statistics, 2017). Medical laboratory scientists and MLT are diagnostically trained laboratory professionals who work with potentially infectious patient samples such as blood, urine, cerebrospinal fluid, and tissues. Medical laboratory scientists and MLT may be on

their feet for prolonged periods during work shifts, and use a variety of technological instruments yielding interpretive data. Similar to nursing, the work environment for MLS and MLT is stressful. Many new graduates start employment during night shifts. Medical laboratory scientists and MLT are diagnosticians, which differ from therapeutic care professions with direct patient contact such as nursing, occupational therapy, and physical therapy.

Salaries for MLS and MLT are below similarly prepared healthcare professionals (Bureau of Labor Statistics, 2017). The BLS (2017) reports the median annual wage for MLS was $61,070 in 2016 with the lowest 10 percent earning roughly $41,550 and the highest 10 percent earning $85,160 or higher. The annual median salary for MLT in 2016 was $38,950 with the lowest 10 percent earning $26,010 or less and the highest 10 percent earning $61,720. In comparison, the median pay for registered nurses was $68,450 in 2016 with the lowest 10 percent earning $47,120 and the highest 10 percent earning $102,990 (Bureau of Labor Statistics, 2017). A comparison of the median annual salary of a MLS with a bachelor's degree to a registered nurse, both female dominated professions (Bureau of Labor Statistics, 2016; Carden et al., 2009), is arguably somewhat substantial especially when comparing highest earners.

Clinical Laboratory Professional Shortage

Approximately 7,000 positions are available annually for laboratory professionals in the U.S. with approximately 6,000 students graduating each year to fill these positions (Scott, 2015). Becoming a MLS or MLT requires an educational investment and potential student debt. Both professions are female dominated (Bureau of Labor Statistics, 2016; Carden et al., 2009). Typically, both MLS and MLT students are required to complete core didactic coursework followed by clinical practicums (Kaplan & Burgess, 2011). Entry-level education for MLS typically is a bachelor's degree while MLT typically enter the workforce with an associate of

applied science degree in the clinical laboratory sciences. Professional clinical practice typically requires certification by the ASCP with the majority of both MLS and MLT employed in state, local, or private hospitals (Bureau of Labor Statistics, 2017). States may require additional certification and/or licensure requirements before one can practice clinically (Bureau of Labor Statistics, 2017). Certification and licensure requirements can make inter-state moves difficult (Kaplan & Burgess, 2011).

The Bureau of Labor Statistics (2017) projects a 13 percent growth rate for MLS and MLT between 2016 and 2026. During times of relative economic uncertainty, completing a degree in the clinical laboratory sciences could be a wise educational investment. Data indicates there is a labor shortage of qualified laboratory professionals due to an aging population requiring increased medical care, increased retirements of laboratory professionals, fewer individuals pursuing degrees in the clinical laboratory sciences, a limited number of online clinical laboratory science programs, and closure of traditional clinical laboratory science programs (American Society for Clinical Pathology, 2004; Carden et al., 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011).

Aging population. People are living longer due to advancements in medical care (Dall et al., 2013). Extended lifespans, however, do not come without potential consequences. For example, people are now living longer with multiple comorbidities including heart disease, diabetes, cancer, and dementia. Physicians often rely heavily upon diagnostic laboratory results for objective data to help diagnose and manage complex disease states and comorbidities. Patients have increasingly complex medical conditions requiring the services of the clinical

pathology laboratory, and ultimately the need for an increasing number of clinical laboratory science professionals to provide these results.

Increasing MLS/MLT retirements. Many MLS and MLT professionals are retiring or nearing retirement age, which is contributing to the professional shortage (American Society for Clinical Pathology, 2004; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Scott, 2015). A survey conducted by Garcia et al. (2015) identified anticipated retirement rates over the next five years by area of laboratory specialization. Various areas of specialization will see significant levels of retirements in the near future (Garcia et al., 2015).

Lack of awareness. The diagnostic branch of the health sciences, including the clinical laboratory sciences, are subject to an overall lack of awareness, and negative perceptions by students and professionals leading to program closures (Kaplan & Burgess, 2010; McClure, 2008, 2009; Perry, 2014). Various allied health professions within healthcare have varying degrees of professional requirements, scopes of practice, work settings, and salary ranges. Arguably, therapeutic professions with a high degree of patient contact are more recognizable than diagnostic professions having limited patient contact including MLS and MLT. Lack of exposure to the clinical laboratory sciences extends to students, parents, and educators alike (McClure, 2009).

Diagnostics vs. therapeutics. Knowledge of diagnostic professions such as the clinical laboratory sciences is often limited when compared to therapeutic professions such as nursing. This is largely due to the lack of direct patient contact. Medical laboratory scientists and MLT may interact with patients while drawing blood, but patients rarely or never go directly to the clinical pathology laboratory. Instead, clinicians or support staff typically obtain specimens and then transport them to the laboratory eliminating or greatly reducing contact with laboratory

personnel. Thus, the clinical laboratory sciences remain a mystery to most patients. This leads to a lack of awareness of the profession amongst students, parents, educators, and career counselors alike (McClure, 2009). Exposing students early in their career exploration to the possibilities the clinical laboratory sciences offer through social media platforms, high school presentations, and on-campus visits can aid in addressing the knowledge and awareness gap about these professions. (Kaplan & Burgess, 2011). Working professionals, however, would need to take it upon themselves for the proposed solutions to be successful. Given most already work long hours and/or nights, these solutions may not be plausible. Even if partly successful, these exposures are only part of the solution to the larger shortage issue.

Lack of career advancement and low salaries. Compounding the effect of a lack of awareness are negative perceptions of the profession by students and clinical laboratory science professionals regarding career advancement opportunities and salaries (McClure, 2008; McClure, 2009). Salaries of MLS and MLT professionals are low when compared to other allied health professions with similar educational requirements (Bureau of Labor Statistics, 2017). Further exacerbating this problem is the perception by students that salaries of clinical laboratory science professionals do not correspond well to the knowledge and training required of them (McClure, 2009). The work environment for diagnostic professionals often includes shift work. Many new graduates begin employment on night shifts. The work is labor intensive and involves limited to potentially no patient contact depending on one's duties and/or setting, which may be desirable to some, but not others.

The clinical laboratory science profession is female dominated. Demographically the profession is similar to nursing, but with lower median salaries: $61,070 for MLS and $38,950 for MLT in 2016 as compared to $68,450 for nursing (Bureau of Labor Statistics, 2016, 2017;

Carden et al., 2009). The nursing profession may be more attractive to this demographic as it is arguably more diverse than the clinical laboratory sciences, has multiple opportunities for professional advancement (e.g., nurse practitioner, nurse anesthetist, etc.), and a variety of work settings/specializations. Students who choose the clinical laboratory sciences as a career may not intend to stay in the field, but rather treat it as a first step in their career pathway (McClure, 2009). Explanations for this may include job security (McClure, 2009), networking opportunities, the benefit of practical experience, and gaining professional references from the field. These steps may strengthen future chances of moving toward more specialized careers. Evidence indicates some clinical laboratory science students wish to further their education, but do not see a clinical laboratory science degree itself as helping them advance their career (McClure, 2008, 2009). This perceived lack of career advancement by both students and clinical professionals has led to negative perceptions, contributing to the labor shortage (McClure, 2008, 2009).

Educational programming options. The clinical laboratory science profession is behind in its adoption of using distance education to deliver academic education compared to other allied health professions. Nearly 50 percent of Bachelor of Science in Nursing completion programs were offered completely online in 2016 (Tate, 2017). By comparison, there were 22 accredited online undergraduate MLS programs, 16 online MLT programs, and 23 online MLT to MLS completion programs using distance education for course delivery at the time of this writing (American Society for Clinical Laboratory Science, 2017a, 2017b). The use of the term 'online' by the American Society for Clinical Laboratory Science (2017a, b) includes programs that are both fully online and hybridized. The overall number of clinical laboratory science distance education programs is relatively small in comparison to the number of programs

nationwide: MLS 233, and MLT 239 (National Accrediting Agency for Clinical Laboratory Sciences, 2017).

Online programs can offer students access to educational opportunities otherwise not available due to geography, personal responsibilities, and cost. The number of non-traditional students returning to school is increasing, and distance education can offer distinct advantages over traditional programs especially when utilizing asynchronous formats (Ross-Gordon, 2011). Program directors and educators within the clinical laboratory sciences have recognized this trend as the number of distance education programs has recently increased (Perry, 2014). In comparison to other allied health educational program offerings there are still opportunities for improvement. Research associated with the academic and practical performance bewteen traditionally trained versus distance education trained clinical laboratory science students demonstrates little to no measurable differences (Freeman, 1995; Hansen-Suchy, 2011; Perry, 2015; Russel et al., 2007). These results support the concept using distance education for program delivery can be a part of the solution to address the labor shortage of MLS and MLT nationally.

Program closures. Lack of awareness, negative perceptions, and aging populations have all contributed to program closures since the turn of the century (Carden et al., 2009; Doby, 2016; Kaplan & Burgess, 2010; McClure, 2008, 2009; Perry, 2014; Scott, 2015). An estimated 67 percent of clinical laboratory science programs closed between 1975 and 2005. Program closures resulted in a 66 percent decrease in the number of clinical laboratory science graduates (Carden et al., 2009). Reasons for the decline include the aforementioned, but additionally the high cost of running such programs may also be to blame (Carden et al., 2009).

The majority of clinical laboratory science program didactic courses have additional laboratory components requiring additional faculty time and resources. Laboratories maintain specific physical spaces with expensive equipment and materials including microscopes, gloves, slides, media, and instrumentation. Costs associated with laboratories in educational settings is high compared to other disciplines without laboratory requirements. For example, the cost of running an academic microbiology laboratory over the course of a semester in an academic setting alone can cost thousands of dollars as a result of purchasing media, kit tests, reagents, etc. Programs often receive donations from clinical affiliates, but this typically only reduces rather than eliminates the financial burden of running such programs. Medical laboratory scientist and MLT programs may find themselves under evaluation for program continuance if their respective college/university determines they are too expensive to offer.

Distance/Online Education

Distance education in the U.S. has been increasing since the turn of the century as the perception of such education has changed amongst both students and faculty. Allen and Seaman (2015) indicated the number of schools believing online education was critical to their strategic plan was 70.8 percent, an all-time high. This sentiment is likely due to the fact the percentage of students enrolling in online degree courses nationwide has steadily increased (Allen & Seaman, 2015). Undergraduate student enrollments in distance education classes was 15.6 percent in 2003-2004 (National Center for Education Statistics, 2014). By comparison, the percentage of undergraduate students taking any distance education class in 2015 had risen to 29 percent (National Center for Education Statistics, 2016).

Approximately 34.5 percent of colleges/universities offered fully online programs in 2002. The number of schools offering distance education increased to 62.4 percent by 2012

(Allen & Seaman, 2013). Health professions including nursing have adapted to these delivery modalities as evidenced by the rise in the number of online Bachelor of Science and nursing degree completion programs (Tate, 2017). The clinical laboratory sciences have begun to adapt to these trends, but opportunities for improvement remain. However, in order for improvement to occur, certain barriers as related to online education need addressing.

Institutional barriers. A lack of faculty release time for creating distance courses, and increased workloads are recognized impediments to faculty using distance education for course delivery (Crawford-Ferre & Wiest, 2012; Darling-Hammond, 2000; Neben, 2014; Vaill & Testori, 2012). Additional barriers include learning and adopting new technologies for course development, institutional financial barriers related faculty compensation, and pedagogical barriers. Some faculty view using distance education for course delivery as inferior to traditional classrooms (Neben, 2014). These barriers come with inherent challenges requiring resolution for the successful design and implementation of distance education classrooms and/or programs to occur.

Faculty/staff distance education training. Training becomes increasingly important as more universities continue increasing online course and program offerings nationwide (Allen & Seaman, 2013, 2015). Research indicates successful implementation of online courses requires faculty training in online teaching methodologies, which can be quite time consuming (Crawford-Ferre & Wiest, 2012; Darling-Hammond, 2000; Vaill & Testori, 2012). For example, educators in distance education programs have additional demands and roles they need to fulfill beyond that of just educator. Distance educators may be responsible for instructional design and technological expertise, both of which require training (Restauri, 2004). Faculty and staff members in higher education are experiencing increased workloads with little opportunity for

professional development as a result of increasing accountability and budget cuts (Jacobs & Winslow, 2004; Mamiseishvili, 2012; Watanabe & Falci, 2016).

Faculty/staff workload. Faculty and staff within the clinical laboratory sciences are no exception to increased workloads. Increased use of instructional designers specially trained in setting up online courses could help aid with this dilemma (Brigance, 2011). However, allowing an instructional designer into the course development process is quite a transition for many educators who may view such a collaboration as invasive (Brigance, 2011). Transitioning from traditional to distance education platforms where educators are no longer the driver of information, but rather facilitators of information can also be quite daunting. Expecting instructors to simply transition from traditional teaching styles to distance education platforms is unrealistic. Therefore, training in online best practices is required for all educators including those within MLS and MLT programs for successful student and faculty/staff experiences. An obvious barrier to this process is time constraints. Educator motivation to transition to distance education is important for a students' academic success.

Perceived barriers. Critics of distance education argue online cheating threatens the integrity of distance education, and has contributed to negative perceptions (Smith & Noviello, 2012). There are ways, however, to help ensure cheating does not take place. For example, institutions can use online proctors and/or other technologies requiring fingerprinting or other identification means such as Webassessor and/or Securexam Remote Proctor (Smith & Noviello, 2012). Cheating can and does occur in traditional institutions and is not just a distance education issue. For example, in large classes of 50 plus students, instructors may not verify a student's identification to ensure it is their student who is completing exams. Thus, perceptions are not always grounded in reality.

Student impacts. Transitioning to distance education classes and/or programs has negative and positive impacts on students (McFarlane, 2011b). Greenleaf 2009 (as cited in MacFarlane, 2011a) cites various advantages using distance education platforms can provide students including having syllabi and instructions readily available, quicker grading, and autonomy for completing class coursework. Disadvantages to distance programs are also recognized within the professional literature. For example, students may be hindered by slow internet connections making online chats difficult. If participating in an online collaborative session, some students may type faster leading to the exclusion of those with poor typing skills (Greenleaf, 2009 as cited in McFarlane, 2011a). Students may also have difficulty adjusting to the technical aspects of an online environment. For example, students may experience network issues such as difficulty joining online group chat sessions or experience other issues with online learning software packages resulting in educators spending a large amount of time answering such questions via email (Restauri, 2004).

Distance education in the clinical laboratory sciences. There were 22 accredited online undergraduate MLS programs, 16 online MLT programs, and 23 online MLT to MLS completion programs in the U.S. at the time of this writing (American Society for Clinical Laboratory Science, 2017a, 2017b). Though the number of online programs has increased, the overall number of online programs is relatively small in comparison to the number of programs nationwide: MLS 233, and MLT 239 (National Accrediting Agency for Clinical Laboratory Sciences, 2017). Several studies have reported on distance education in the clinical laboratory sciences (Esani, 2010; Freeman, 2010; Hammerling, 2012; Hansen-Suchy, 2011; McCown, 2010; Perry, 2014; Russell et al., 2007; Thomas & Hadley, 2015). However, no literature was identified as part of this study addressing specific motivating and inhibiting factors impacting

clinical laboratory science program directors' decision to use distance education for academic programs and/or courses.

Academic outcomes. A profession like the clinical laboratory sciences relies heavily on applied practical, hands-on experience for students to achieve minimal professional competency (National Accrediting Agency for Clinical Laboratory Sciences, 2013). Transitioning to using fully online programs may be difficult. Consequently, the quality of students completing such distance programs may be questioned (Perry, 2014). Several studies have compared traditional clinical laboratory science students to their online counterparts with little to no significant academic peformance differences identified (Freeman, 1995; Hansen-Such, 2011; Perry 2014; Russel et al., 2007).

Best practices using distance education. Online best practices requires effectively using educational technologies, social media platforms, while addressing teaching styles (Hammerling, 2012). The online format should utilize a course management system like Blackboard, Canvas, or Desire 2 Learn with a simple, straightforward layout. In addition, educators need to be cognizant of the shift in teaching style required of distance education instructors. When using distance education for course delivery, logging in to participate in discussion boards, answering student emails, and grading rather than delivering in-person lectures are noted for best practices for online teaching and learning (Hammerling, 2012). Additionally, educators' may hold web conferences with students or facilitate group work in online environments effectively becoming facilitators of student learning (Hammerling, 2012). Contemporary students differ from past counterparts, and students expect portions of courses to be online even in traditional programs (Freeman, 2010).

Barriers to using distance education in the clinical laboratory sciences. The concepts of social presence (Esani, 2010) and isolationism (Bejerano, 2008) are factors further complicating educators transitioning from traditional to distance education. For example, an obvious distance exists in an online environment as students and educators no longer share the same physical classroom. This separation is minimized, however, through the creation of an online social presence. Additionally, asynchronous formats and distance education in general can create a sense of isolation for online students (Bejerano, 2008). To combat this, instructors can utilize technology constructively, rather than allowing the technology to distance participants. For example, instructors can create an online social presence and reduce isolationism by posting an introductory video of themselves, and by having students share something about themselves via an online discussion board at class inception (Esani, 2010). A mix of synchronous and asynchronous formats could also be utilized. For example, instructors could conduct online collaborative sessions, create group workspaces, and/or hold online office hours creating a greater sense of community.

Faculty are experiencing increased workloads nationwide (Gous & Roberts, 2015; Jacobs, 2004; Mamiseishvili, 2012; Montero-Hernandez et al., 2014). Thus, transitioning to distance education may prove especially challenging for applied programs such as the clinical laboratory sciences due to time constraints. In addition, transitioning to distance education may require a paradigm shift and can elicit fear including that associated with a loss of academic freedom, the unknown, and failure (Mitchell, Parlamis, & Claiborne, 2015; Self & Schraeder, 2009). Faculty and staff 'buy in' is imperative for transitioning to using distance education for it to be successful (Mitchell et al., 2015).

Time constraints. Clinical laboratory science education involves extensive hands-on practical training. Psychomotor skill development requires extensive time of clinical laboratory science instructors in both university and hospital-based programs. Concurrently, NAACLS (2017b) requires students' complete clinical practicums requiring articulation agreements between universities and clinical sites. The creation and implementation of articulation agreements is challenging for it requires additional time of MLS and MLT directors in both academic and clinical settings, and places teaching responsibilities on busy clinical preceptors.

Technology has become very influential of teaching and learning (Hammerling, 2012), and this is no exception for distance education in the clinical laboratory sciences. Training for all faculty and staff involved in online education is vitally important to ensure good student outcomes (Austin & Sorcinelli, 2013). The problem is not necessarily a lack of training opportunities (Vaill & Testori, 2012), but rather finding time to participate. Clinical laboratory science program directors and educators often have additional responsibilities beyond teaching, service, and research including continuing medical education requirements, clinical affiliation agreements, site visits, and accreditation. These responsibilities create additional time constraints, and make it difficult to pursue training in online education course development. This can result in dissatisfaction amongst both faculty members and students (Crawford-Ferre & Wiest, 2012).

A blended format using online lectures, discussions, and case studies mixed with on-campus laboratories on weekends or nights allowing for practical experiences may be more applicable for the clinical laboratory sciences. Similar healthcare professions, such as the radiologic sciences, have increasingly adopted these blended formats (Kowalczyk, 2014). Practical components of clinical laboratory science student didactic training could be achieved

using clinical mentors in the geographic location of the student via articulation agreements (Thomas & Hadley, 2015). This eliminates the need for on-campus visits making distance programs a possibility for a greater number of students especially those deemed non-traditional. In essence this signifies a return to the apprenticeship model of education (Walker, Golde, Jones, Bueschel, & Hutchings, 200). The apprenticeship model is one in which a novice is placed under the tutelage of a master of a particular trade to learn said trade through hands on practical training (Merriam-Webster online, n.d.).

Using an apprenticeship model benefits both students and clinical sites; and helps address labor shortages. Students benefit from the practical knowledge obtained by working in an actual clinical setting for arguably even the best simulation is still not truly reflective of the clinical environment. Clinics can benefit by adding much needed help to the clinical laboratory. There is a learning curve for students initially, but once they begin to become proficient in laboratory procedures and protocols they become valuable members of the laboratory team. Students may also find gainful employment at the completion of their clinical rotation i.e. a return to the apprenticeship model (Walker et al., 2008).

Paradigm shift. Achieving fully online academic programs may be difficult for a practical-based profession like the clinical laboratory sciences. A paradigm shift would be required of clinical laboratory science faculty and staff as evidenced by the number of MLS and MLT programs nationwide compared to distance education programs: 233 total MLS programs, 239 total MLT programs versus 22 accredited online undergraduate MLS programs, 16 online MLT programs, and 23 online MLT to MLS completion programs (American Society for Clinical Laboratory Science, 2017a, 2017b).

Expecting faculty and staff who have taught primarily traditional face to face courses to seamlessly adapt to using an online learning environment where they become facilitators of learning may be unrealistic (Vaill & Testori, 2012). This paradigm shift can be difficult and may not come naturally; thus, the need for faculty and staff training. Research shows teacher education and training in online teaching methodologies improves both student experiences and outcomes in online environments (Crawford-Ferre & Wiest, 2012; Darling-Hammond, 2000; Vaill & Testori, 2012). Thus, identifying motivating and inhibiting factors impacting clinical laboratory science programs directors' use of distance education is vital. Understanding such factors could support program directors decision-making for developing, offering, and taking distance education training. Such training can help create successful online programs for students, educators, universities, and patients.

Theoretical Framework

A questionnaire originally prepared by Betts (1998) was grounded in Deci and Ryan's (1985) motivation theory that emphasized both intrinsic motivation and self-determination. Self-determination theory (SDT) was updated by Ryan and Deci (2017) and is predicated on six mini-theories: cognitive evaluation theory, organismic integration theory, causality orientations theory, basic psychological needs theory, goal contents theory and relationship motivation theory (Ryan & Deci, 2017). Betts' questionnaire was developed to determine both extrinsic and intrinsic factors motivating individuals to participate in distance education along with factors inhibiting participation (Betts, 1998). The current study primarily seeks to identify motivating and inhibiting factors impacting clinical laboratory science program directors' use of distance education. Thus, SDT is directly applicable.

Ryan and Deci (2017) self-determination theory. This research uses a modified data collection instrument initially created and validated by Betts (1998) and later modified by Betts (2014). Permission to use and modify the questionnaire was requested of and granted by Dr. Betts (see Appendix A). Motivation theory as developed by Deci and Ryan (1985) as originally used by Betts (1998) along with Ryan and Deci's (2017) further expansion of SDT shape the theoretical foundation of this study.

Self-determination theory has evolved from the work of early theorists who initially linked motivation to performance. Later, drive theories such as that of Hull (as cited in Ryan & Deci, 2017) looked at basic physiologic needs such as hunger, thirst, sexual drive and the avoidance of pain as primary motivators. Early drive theories and later cognitive theories used to describe motivation were univariate and primarily concerned with the strength of motivation, a recognized weakness (Ryan & Deci, 2017). Self-determination theory, however, moves beyond this univariate approach by also investigating the sources of motivation itself. Thus, as Ryan and Deci (2017, p. 3) state "SDT research thus critically inquires into factors, both intrinsic to individual development and within social contexts, that facilitate vitality, motivation, social integration and well-being, and, alternatively, those that contribute to depletion, fragmentation, antisocial behaviors and unhappiness."

Self-determination theory states people have basic needs described as "nutrients" that need to be met; both physiologic, as other theories have been based upon, but also three psychological needs: autonomy, competence and relatedness (Ryan & Deci, 2017). These needs are vital to one's motivation, and their overall psychological well-being. The first psychological need of autonomy is concerned with self-regulation i.e. having the freedom to act in accordance with one's own ideals and interests (Ryan & Deci, 2017). Autonomy, however, in SDT also

recognizes people can have external pressures exerted upon them acting as impediments to one's autonomy. The need for competence is rooted in the work of White (as cited in Ryan & Deci, 2017). Competence is concerned with a human's feeling mastery and effectance, which as described by White (as cited in Ryan & Deci, 2017) refers to the tendency people have to interact or explore their environment along with the tendency to influence that environment as well. Ryan and Deci (2017) further explain competence does motivate, but an absence of competence can inhibit. For example, when a task is viewed as being too difficult to master competence and motivation diminish. The last need, relatedness, concerns the human need for social connectivity i.e. the need for being cared for and having a sense of belonging (Ryan & Deci, 2017). Lacking any of the above needs can negatively impact one's motivation (Ryan & Deci, 2017).

Part of the usefulness of a theory lies in its ability to be applied to and explain practical situations. To that end, Ryan and Deci (2017) apply SDT to the work setting. Self-determination theory does not assume work to be simply an exchange of one's time and energy for money. Instead it takes a more holistic view of work and its relations to the human needs of autonomy, competence and relatedness; indicating a much deeper relationship potential for humans and their work (Ryan & Deci, 2017). Indeed, there are those of us who may work simply for financial reasons: family, food, healthcare, etc. Many of us also work for feelings of accomplishment, pride, usefulness, togetherness; concepts encompassed within SDT and the three psychological needs. Self-determination theory recognizes needs are met in the work setting through a combination of both intrinsic and extrinsic motivators, which varies by individual (Ryan & Deci, 2017). However, SDT does state intrinsic motivators are perhaps more powerful than extrinsic motivators. In addition, SDT does not assume extrinsic and intrinsic motivators are always both positive influencers. Early studies by Deci (1971) indicated individuals completing intrinsically

rewarding work found the work to be less motivating when they were rewarded extrinsically for that work.

These concepts are further explained by studies highlighting the importance of autonomy as a managerial tool rather than a managerial style of control and reward via extrinsic motivators (Doshi & McGregor, 2015 as cited in Ryan & Deci, 2017). The importance these needs be met is not only vital to individuals, but also to corporations and industry. When not met, people may lack motivation resulting in decreased morale and poor performance; consequences that can negatively impact a company's bottom line. However, research has shown when the three psychological needs are met, performance improves as do the benefits to corporations. (Ryan & Deci, 2017).

Academia is a highly competitive business similar to healthcare. Clinical laboratory science education programs exist in both these arenas. The labor shortage is an issue not only impacting clinical laboratory science programs, but theoretically it potentially impacts any individual requiring laboratory services nationally. Having competent, motivated clinical laboratory professionals is vital for patient safety and efficient turn-around times. Increasing the number of students graduating from such programs is therefore one vital piece in addressing this issue; more specifically increasing the number of distance education programs. For these reasons motivation theory, specifically SDT, formulates the theoretical underpinnings of this study. Understanding factors motivating and inhibiting clinical laboratory science program directors' decision to use distance education is an important step in implementing more distant education programs.

Related Studies

Several studies were identified addressing motivating and/or inhibiting factors to faculty participation in distance education (Al-Salman, 2013; Beggs, 2000; Betts, 1998, 2014; Bruner, 2007; Cook et al., 2009; Kowalczyk, 2014; Lloyd, Byrne & McCoy, 2012; Porter & Graham, 2016, Schifter, 2000). Studies include work by Betts (1998, 2014), the creator of the modified questionnaire used in this research, in addition to other studies using a similar instrument (Beggs, 2000; Schifter, 2000). The majority of these studies differ from the current study as they involved single institutions (Beggs, 2000; Betts, 1998, 2014; Bruner, 2007; Lloyd et al., 2012; Porter & Graham, 2016, Schifter, 2000). Two studies were reviews of other works looking at motivators and inhibitors (Al-Salman, 2013; Cook et al., 2009), and one study was similar to the current study in using a national registry of allied health professionals to help identify barriers to distance education usage (Kowalczyk, 2014).

These studies often found intrinsic motivators such as the ability to help students and/or diversifying one's course offerings as primary motivators (Betts, 1998, 2014; Schifter, 2000). However, additional research found extrinsic motivators were also impactful (Cook et al., 2009). This reinforces the need for the current study to filter out intrinsic and extrinsic motivators (see appendix B).

Kowalczyk's (2014) study specifically addressed barriers faced by radiology educators in the United States using distance education. An electronic survey was created with four main topics: the status of online education in the radiologic sciences, instructor history with distance education, self-identified instructional technology efficacy, and the last section obtained demographic information. The survey was disseminated to 365 individuals of which 102 responded for a response rate of roughly 28 percent. Three major themes emerged from the

study: instructional technology training and support barriers, student related barriers, as well as institutional barriers. The greatest barriers identified included a lack of training/lack of instructional technology support, and an overall lack of instructor confidence regarding their ability to use instructional technology.

The radiologic sciences are similar to the clinical laboratory sciences in that both require clinical applications. Similar to the clinical laboratory sciences, the radiologic sciences have recently seen an increase in online course offerings, but Kowalczyk (2014) indicates the use of online education is not all that prevalent and fully online programs are likely not attainable. This represents a scenario the clinical laboratory sciences may also face.

Summary

Motivating and inhibiting factors of faculty participation in distance education courses within the health sciences has been relatively well documented. However, no literature was identified as part of this study specifically looking at the motivating and inhibiting factors facing clinical laboratory science program directors usage of distance education.

Intrinsic motivators heavily influence faculty participation in distance education programs (Betts, 1998, 2014; Schifter, 2000), but additional research has indicated a shift or at least an increase in the valuation of external rewards including technological support, increases in salary/merit, release time, and advancement opportunities i.e. tenure (Cook et al., 2009). If institutions housing clinical laboratory science programs wish to transition their traditional programs to some form of distance education, understanding and recognizing these motivators could help with faculty acceptance.

Various barriers exist relating to using distance education for program delivery, but little has been identified specifically associated with the clinical laboratory sciences. Recognition of

these barriers and their mitigation may be imperative for institutions looking to transition their traditional clinical laboratory science programs to distance education programs.

Chapter III: Methods and Procedures

Traditional clinical laboratory science programs have been declining contributing to the overall labor shortage. (American Society for Clinical Pathology, 2004; Carden et al., 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011). However, this situation should not be perceived as negative for it provides existing programs nationwide the opportunity to increase online course and/or program offerings to help fill the national shortage. The purpose of this study was to explore factors impacting clinical laboratory science program directors' decision to use distance education. For the purposes of this study, clinical laboratory science program directors were those identified on a national registry as being associated with a MLS university/college-based program, technical/college-based MLT program, and/or hospital- based MLT/MLS program.

Similar studies have examined motivators and/or barriers faced by faculty at individual institutions or related allied health fields (Betts, 1998; Betts, 2012; Cook, Ley, Crawford & Warner, 2009; Kowalczyk, 2014); but none have specifically studied the clinical laboratory sciences. The goal of this research was to address the gap in the scientific literature examining motivating and inhibiting factors impacting clinical laboratory science program directors' decision to use distance education.

This study aimed to add to the literature concerning distance education in the clinical laboratory sciences by studying three main groups: 1) program directors in Medical Laboratory Scientist (MLS) university/college-based programs; 2) program directors in Medical Laboratory Technician (MLT) technical and/or college-based programs; and 3) program directors at hospital based MLS/MLT programs.

First, this study aimed to identify intrinsic and extrinsic factors motivating use of distance education. Second, the research design aimed to identify factors that inhibit the use of distance education. Third, the study was designed to explore similarities and differences amongst the top motivating and inhibiting factors impacting clinical laboratory science program directors with and without prior distance education experience. Fourth, the research was designed to explore differences in motivating and/or inhibitory factors between directors in different academic settings: Medical Laboratory Scientist (MLS) university/college-based programs, Medical Laboratory Technician (MLT) technical and/or college-based programs, and at hospital-based MLS or MLT programs.

To help achieve these aims, the following research questions were addressed:

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?
2. What factors inhibit clinical laboratory science program directors from using distance education?
3. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience?
4. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings?

Research Methodology

This study was approved by the University of Wisconsin-Stout Institutional Review Board prior to data collection (see Appendix C).This study was based on previous works by Betts (1998, 2014) aimed at identifying motivating and inhibiting factors influencing educators. This research is different, however, in it does not address a single institution, but instead a sample of clinical laboratory science program directors at the national level. The primary purpose of this research was to identify motivating and inhibiting factors influencing participation in distance education.

A quantitative research design, specifically a primary cross-sectional survey design, was employed using a modified version of the surveys utilized by Betts (2014) for addressing the research questions. Dr. Betts was contacted for permission to utilize and modify the instruments to survey clinical laboratory science program directors, which was granted (personal communication, June 22, 2017, see Appendix A). Modifications were made to the instructions and definitions, and to the demographic section of the questionnaire to make it relevant for this study. One motivating factor was specific to the institutional study by Betts (2014), and was removed. The original five-point Likert scale was modified to a four-point Likert scale at the request of the dissertation committee to prevent response ambiguity and avoiding a neutral response category. The questionnaire was disseminated to the entire study population of clinical laboratory science program directors via email of record from the NAACLS website of accredited MLS and MLT programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017a).

Subject Selection and Description

The professional shortage facing the clinical laboratory sciences is a national issue. The Bureau of Labor Statistics (2017) estimates there are 10,284 MLS and 9,852 MLT educators in nationally working in two-year technical colleges, four-year university-based programs, and hospital-based programs. Despite efforts to locate one, a national registry of all clinical laboratory science educators was not available, therefore, the population for this study was all clinical laboratory science program directors listed on the National Accrediting Agency for Clinical Laboratory Sciences (2017) website, which serves as the premiere accrediting body for clinical laboratory science programs. The website lists a single programmatic contact (program director) for accredited two-year, four-year, and hospital-based programs for a total study population of 472 accredited programs at the time of this writing, however, some universities had multiple accredited sites with a single programmatic contact creating a total of 467 clinical laboratory science program directors. For this research a census was conducted. Emails were sent to all 467 clinical laboratory science program directors on the NAACLS (2017a) website comprising the study population. Conducting a census ensures the entire study population had an equal opportunity for inclusion in the study, and therefore the study sample obtained via those responding to the questionnaire was random allowing for the use of inferential statistics.

Contact information on the NAACLS website allowed for the population to be divided into groups via demographic questions embedded within the questionnaire for it included both traditional and distance education program contacts at three major academic settings. Respondents were divided into two groups: 1) program directors with previous distance education experience, and 2) those without previous distance education experience to aid in answering research question three. Respondents were also divided into three groups based on

academic setting: 1) Medical Laboratory Scientist (MLS) university/college-based programs, 2) Medical Laboratory Technician (MLT) technical and/or college-based programs, and 3) clinical laboratory science educators at hospital-based MLS or MLT programs to aid in answering research question four.

Instrumentation

Each MLS and MLT program from the NAACLS website had one program director listed as a person of contact with accompanying email information. These contacts served as the basis for the study population and were contacted via email to complete the study questionnaire.

This study utilized a modified version of Betts (2014) questionnaire focused on identifying factors impacting program director participation in distance education, which was based off the original instrument created by Betts (1998). Permission was sought to use and modify the instrument, which was granted by Dr. Betts (personal communication, June 22, 2017, see Appendix A). The questionnaire used in this study had three sections with a total of 54 questions. The first section consisted of five questions modified to obtain demographic data specific to clinical laboratory science program directors including previous experience with distance education, and work setting allowing for separation into comparison groups. Next respondents were asked to rate various motivating and inhibiting factors impacting their participation in distance education utilizing scored Likert scales. The original instruments used by Betts (1998, 2014) utilized a five-point Likert scale including a 'neutral' option. It was at the request of the dissertation committee to alter the scale to a four-point rating system removing the 'neutral' option for this study.

More specifically, section one aimed at obtaining demographic data of respondents including previous distance education experience effectively creating two groups: those with and

those without previous distance education experience. A separate demographic question sought their current work setting: MLS university-based, MLT technical/college-based, or hospital based MLS/MLT program effectively creating three groups based on educational setting.

The second section of the instrument was nearly identical to Betts (2014) that originally included 30 motivating factors, however, one question was removed as it was institution specific, and therefore not applicable to this study (personal communication, June 22, 2017, see Appendix A). In addition, the survey data published by Betts (2014) listed 29 motivating factors. Sample instruments sent by Dr. Betts included 30 motivating factors (see Appendix D). The last of the motivating factors "opportunity to enhance/expand my teaching experience" did not appear on the electronic questionnaire used in the Armstrong 2012 study (Betts, 2014), but is included as part of this research (Dr. Betts, personal communication, September 29, 2017, see Appendix D). Therefore, the questionnaire used in the current study included 29 total motivating factors including the question originally omitted in Betts (2014) study, while again removing the institutional specific question in Dr. Betts' research (see Appendix E). The wording of each motivating factor used as part of this study was identical to that used by Betts (2014). However, modifications were made to the instructions of section II to fit the needs of this research.

The third section of the questionnaire addressed 20 inhibiting factors impacting clinical laboratory science program director participation in using distance education, which were identical to the instrument developed and utilized by Betts (2014). The instructional wording of section III, however, was modified for the purposes of this study.

Both the motivating and inhibiting factors were scored on a four- point Likert scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree), which did deviate from Betts (2014). This change encouraged program directors to select an agreement rather than allowing a

neutral option. The instrument contained 54 questions in total: five demographic questions in section I, 29 motivators in section II and 20 inhibitors in section III.

The questionnaires created by Betts (1998, 2014) and utilized in this study, with minor modifications to the motivating and inhibitor sections, is a vetted instrument. Face and content validity, and the internal reliability of the instrument have been previously established (Betts, 1998, 2014). The updated instruments as part of the Armstrong 2012 study were pilot tested by Dr. Betts using a test-retest reliability (Betts, 2014). Cronbach alphas of .953 and .924 for motivating and inhibiting factors were established in Betts (2014) study indicating a high degree of internal consistency. Reliability and validity of the original instrument was also established via a modified Delphi, pilot study, and faculty interviews (Betts, 1998).

Data Collection Procedures

An electronic copy of the questionnaire created using Qualtrics with the anonymize response option enabled, was emailed via hyperlink to all program directors listed on the NAACLS website for accredited MLS and MLT programs. Four emails were disseminated as part of the study. All emails requested implied consent and contained an introduction informing potential subjects of the researcher, the purpose of the research, indication responses would remain anonymous, how the research would be used, and their participation was voluntary. The first email (see Appendix F) was sent on January 16, 2018, and served as a friendly introduction to the research informing potential respondents an additional mailing (see Appendix G) would be sent with a live survey link on January 23, 2018. A reminder email was sent on January 30, 2018 (see appendix H), and a final reminder was sent February 20, 2018 (see Appendix I). Reminders were used to increase survey response, and to inform directors surveys needed to be completed by February 23, 2018.

Data Analysis

Both descriptive and inferential statistics were used in analyzing the data obtained from the Qualtrics survey. Inferential analyses assume a random sample; therefore, inferential statistics were appropriate as every member of the study population had an equal chance of being included in the research, and therefore created a random sample. The level of significance was set at a 95% confidence interval, $p < 0.05$.

Descriptive statistics including means, ranges, frequencies, percentages and standard deviations were used to analyze research questions one and two. Inferential analyses included Pearson correlation coefficients, independent sample t-tests, and analysis of variance (ANOVA). More specifically, Pearson correlation coefficients were appropriate to help analyze research questions one and two as the data was quantitative and lent itself to studying positive and negative relationships. Independent-sample-t-tests were appropriate for analyzing research question three as the data for the dependent variable was obtained from a Likert scale, and could be treated at the interval level of measurement. Terrell (2012) states independent-sample-t-tests are used to assess mean differences when you have one independent variable with two levels; specific to this research were those with distance education experience and those without distance experience along with one specific dependent variable: the particular motivating or inhibiting factor also an interval level of measurement. Analysis of variance was used to analyze research question four, which had one independent variable with three levels: MLS, MLT, or hospital-based, and a dependent variable obtained using a Likert-like scale with a scoring range of 1-4 (strongly disagree to strongly agree). Thus, the data was quantitative and could be analyzed at the interval level of measurement allowing for tests of ANOVA. A multiple

comparison test, specifically the Bonferroni test, was used for comparisons between the levels of ANOVA to determine which results were significantly different from each other (Terrell, 2012).

The study included a large number of variables with 29 motivating and 20 inhibiting factors, therefore running too many tests could create Type I errors (Terrell, 2012). To adress this issue, the top seven intrinsic motivating factors, top eight extrinsic motivating factors, and top 10 inhibitors were analyzed via inferential statistics rather than each factor analyzed individually in answering the research questions. This reduced the number of tests needed to be run and reduced type I errors.

Limitations

A pilot study was not conducted as part of this research. The survey utilized by Betts (2014) and slightly modified for this study was previously validated via pilot studies establishing face validity, content validity, and internal consistency with Cronbach alpha results of .953 and .924 for motivating and inhibiting factors.

Volunteerism is a recognized weakness of the study (Patten, 2009). The study attempted to conduct a census of the study population: all program directors listed on the NAACLS website of accredited MLS and MLT programs in the United States. However, responses were not 100 percent resulting in a random sample obtained by volunteerism, a recognized weakness (Patten, 2009). However, the respondents were all clinical laboratory science program directors of accredited programs at the national level, and the researcher believes still representative of the larger population of clinical laboratory science program directors within the U.S.

This study also treated the clinical laboratory science program directors from the NAACLS website as the study population. This allowed for generalizations from the random sample obtained to this study population, but not necessarily to the theoretical population of all

clinical laboratory science educators including those who are not program directors throughout the nation.

The sample size for program directors in hospital-based MLS and/or MLT programs was relatively small (n = 26). This sample does not necessarily equate to strong comparisons with MLS and MLT groups as analyzed in research question four. However, the sample does approach the size recommended by Terrell (2012, p. 122) who states "it is generally agreed that a sample size of 30 is large enough."

Summary

This study aimed to assess a study population of clinical laboratory science program directors obtained through a national registry of such educators associated with accredited programs throughout the nation. Data obtained was quantitative from the use of an online Qualtrics survey. The majority of data obtained from the questionnaire was from Likert questions with a scoring scale ranging from 1-4 (strongly disagree to strongly agree). Data was treated at the interval measure scale allowing for the use of parametric inferential statistics to draw conclusions from the sample to the study population.

Chapter IV: Presentation of the Findings

The purpose of this study was to assess motivating and inhibiting factors impacting clinical laboratory science program directors across the U.S. Program directors were identified using a national registry of accredited MLS and MLT programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017a). Previous studies have looked at motivating and inhibiting factors affecting faculty participation in distance education, however, none specifically addressed the clinical laboratory sciences.

This study had several goals. First, this study aimed to identify intrinsic and extrinsic factors motivating clinical laboratory science directors to use distance education. Second, the research design aimed to identify factors that inhibit clinical laboratory science directors from using distance education. Third, the study was designed for exploring similarities and differences amongst the top motivating and inhibiting factors impacting clinical laboratory science program directors with or without prior distance education experience. Fourth, it looked to explore differences in motivating and/or inhibitory factors between educators at different programmatic settings: MLS university/college-based programs, MLT technical and/or college-based programs, and educators at hospital-based MLS or MLT programs.

To help achieve the above goals, the following research questions were addressed:

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?
2. What factors inhibit clinical laboratory science program directors from using distance education?

3. Are there differences in motivating and/or inhibiting factors between clinical laboratory science program directors with distance education experience versus those without distance education experience?
4. Are there differences in motivating and/or inhibiting factors between clinical laboratory science program directors at different academic settings?

Response Rate

A census was attempted of all program directors listed on a national registry of accredited MLS and MLT programs in the United States (National Accrediting Agency for Clinical Laboratory Sciences, 2017a). This list totaled 472 programs at the time of this study, however, when removing repeat emails this reduced the amount to 467 possible directors. The email was created and disseminated using Qualtrics. The email distribution using Qualtrics indicated several emails were not deliverable creating a study population of 460 total program directors in the U.S. associated with NAACLS accredited programs. At survey close, 163 respondents returned completed surveys for a 35 percent response rate comprising the study sample.

Demographics

The questionnaire contained five demographic questions aimed at obtaining information regarding the program location, self-identification as MLS, MLT or hospital-based director, years spent teaching, experience with distance education, and academic teaching load. As reported in table 2, there was national representation of directors from various states as addressed in demographic question number one. Texas had the most respondents, 16 (9.82 percent each) followed by Minnesota, North Carolina, Pennsylvania, and Wisconsin each having eight respondents (4.91 percent each). Michigan, New York and Tennessee each had seven respondents (4.29 percent each).

Table 2

Number of Respondents by State

State	Number of Respondents	%	State	Number of Respondents	%	State	Number of Respondents	%
AL	3	1.84%	MD	4	2.45%	RI	1	0.61%
AK	1	0.61%	MA	2	1.23%	SC	1	0.61%
AZ	2	1.23%	MI	7	4.29%	SD	0	0.00%
AR	2	1.23%	MN	8	4.91%	TN	7	4.29%
CA	2	1.23%	MS	6	3.68%	TX	16	9.82%
CO	3	1.84%	MO	3	1.84%	UT	1	0.61%
CT	2	1.23%	MT	0	0.00%	VT	0	0.00%
DE	2	1.23%	NE	2	1.23%	VA	3	1.84%
FL	6	3.68%	NV	0	0.00%	WA	2	1.23%
GA	4	2.45%	NH	1	0.61%	WV	2	1.23%
HI	0	0.00%	NJ	2	1.23%	WI	8	4.91%
ID	1	0.61%	NM	1	0.61%	WY	0	0.00%
IL	5	3.07%	NY	7	4.29%			
IN	2	1.23%	NC	8	4.91%			
IA	2	1.23%	ND	3	1.84%			
KS	4	2.45%	OH	5	3.07%			
KY	3	1.84%	OK	4	2.45%			
LA	6	3.68%	OR	1	0.61%			
ME	0	0.00%	PA	8	4.91%			

The second demographic question obtained information on how directors identified themselves. As reported in table 3, 46 percent of respondents identified as MLT college-based followed by MLS university/college based (35 percent) and 16 percent as hospital-based directors. Five individuals specified "other" for their setting with four of the five offering further explanations in the supplied text box. Each of the four indicated they were located at college/university based MLT and MLS programs.

Table 3

Program Director Identification by Work Setting

Variable	Number of Respondents	%
Educator at a MLS university/college-based program	57	35
Educator at a MLT technical and/or college-based program	75	46
Educator at a hospital-based MLS or MLT program.	26	16
Other	5	3
Total	163	100

Note. MLS = Medical Laboratory Scientist; MLT = Medical Laboratory Technician.

Years of teaching experience ranged from as little as one year to 35 plus years addressing demographic question three. As reported in Figure 1, 74 (45 percent) of directors had 10-20 years of teaching experience. This was followed by 34 directors having 21-30 years of experience and 32 having zero to nine years of experience. Twenty-three directors had 31-35 plus years of experience. The greatest number of respondents (n = 16, 10 percent) reported having 20 years of teaching experience. The mean number of years teaching for MLS, MLT and hospital-based directors was 20.4, 16.8 and 17.4 years respectively.

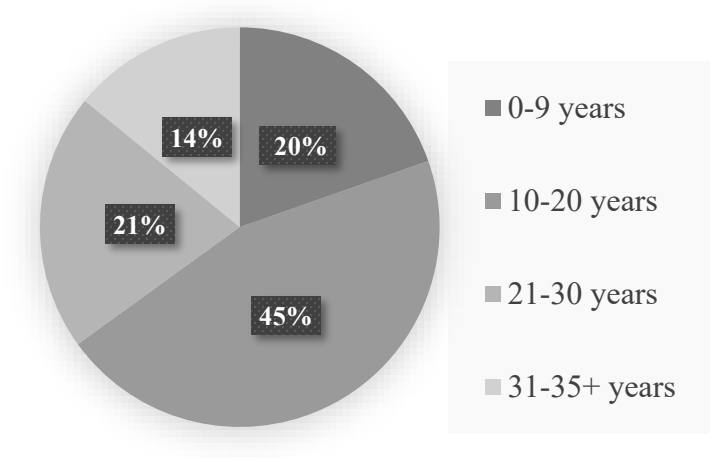

Figure 1. Percentage of directors as related to years of teaching experience.

The fourth demographic question obtained information regarding previous experience with distance education. As reported in Figure 2, 89 respondents (roughly 55 percent) had previous experience with distance education where at least 30 percent of content was delivered online. Forty respondents (roughly 25%) indicated they teach traditional courses where zero percent of content is delivered online.

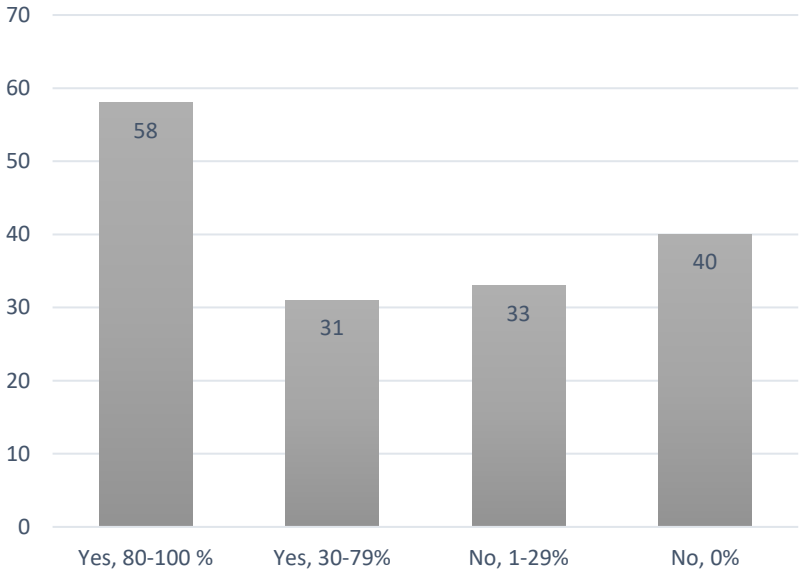

Figure 2. Number of directors with distance education experience.

Experience with distance education was also analyzed by academic setting: MLS, MLT or hospital-based as indicated in Table 4. One respondent did not indicate their experience in an MLS setting resulting in n=162 for this question. Directors' identifying themselves as a MLS in an academic setting had the most experience with distance education (roughly 75 percent) followed by MLT (roughly 55 percent), and last directors self-identified as hospital-based (roughly 12 percent).

Table 4

Experience with Distance Education by Work Setting

Variable	MLS		MLT		Hospital-Based	
	Frequency	%	Frequency	%	Frequency	%
Yes, 80-100% online	32	56.1	24	32.0	2	7.7
Yes, 30-79% online	11	19.3	17	22.7	1	3.8
No, 1-29% online	6	10.5	18	24.0	6	23.1
No, 0% online	7	12.3	16	21.3	17	65.4
Total	56	98.2	75	100.0	26	100.0

The last demographic question addressed what percentage of a director's current academic load was dedicated to teaching (see Table 5). Overall, nearly 59 percent of respondents indicated most of their time was dedicated to teaching. Only 15 percent indicated 0-25 percent of their time was dedicated to teaching. Nearly 71 percent of MLT program directors spent at least 50 percent of their time teaching followed by 56 percent of MLS program directors, and approximately 31 percent of hospital-based directors.

Table 5

Percent of Academic Load Dedicated to Teaching

Variable	MLS		MLT		Hospital-Based	
	Frequency	%	Frequency	%	Frequency	%
0-25%	9	15.8	7	9.3	8	30.8
26-50%	16	28.1	15	20.0	10	38.5
51-75%	24	42.1	29	38.7	5	19.2
76-100%	8	14.0	24	32.0	3	11.5
Total	57	100.0	75	100.0	26	100.0

Item Analysis of Research Questions

This quantitative cross-sectional study sought to answer four research questions via the utilization of a previously validated questionnaire (Betts, 1998, 2014). Sections two and three of the questionnaire were slightly modified from the original instrument and contained a total of 49 questions. Specifically, section two had 29 motivating factors and section three consisted of 20 inhibiting factors; all of which were scored on a four-point Likert scale: (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). Therefore, mean scores of 3.0 or above was the threshold for indicating agreement with a statement, and mean scores of 2.0 or less was the threshold for disagreement. The level of significance was set at a 95% confidence interval, $p < 0.05$.

Research question 1: What factors motivate clinical laboratory science program directors' decision to use distance education? Descriptive statistics including means, frequencies, and standard deviations helped answer this question. Inferential statistics included Pearson's correlation coefficient. The Qualtrics survey utilized a four-point Likert scale (4 =

strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree) to assess a respondent's level of agreement with 29 motivating factors. Directions asked respondents with and without distance education experience to indicate their level of agreement with each motivator as 'having motivated' or 'would motivate' them respectively. The research question was also divided into two subparts to distinguishing between intrinsic and extrinsic factors. Mean scores of 3.0 or above was the threshold for indicating agreement with a statement. Program directors' selecting 'not applicable' were not included in the analysis resulting in varied response rates.

Eleven of the 29 motivators scored above the 3.0 threshold indicating agreement with most motivators with means ranging from 2.3 to 3.36. Table 6 ranks the motivating factors for all program directors with means at or above 3.0. The number of respondents included in the analysis excludes those selecting 'not applicable' on the survey instrument. The highest-ranking motivator for all program directors was 'greater course flexibility for students' (mean = 3.36, SD = 0.73). This was followed by 'ability to reach students who cannot come to campus' (mean = 3.33, SD = 0.77), and 'greater course flexibility for faculty' (mean = 3.28, SD = 0.74). There was a breakpoint in mean values following the top three motivators indicating directors did not as strongly agree with these statements. The top extrinsic motivator was 'access to adequate equipment to support distance education teaching' (mean = 3.18, SD = 0.78). The lowest scoring motivator was 'recognition and awards (mean = 2.3, SD = 0.80).

Table 6

Ranked Summary of Factors Motivating Directors' Use of Distance Education with Means at or Above 3.0

Variable	Number of Respondents	Mean	SD
Greater course flexibility for students	159	3.36	0.73
Ability to reach students who cannot come to campus	149	3.33	0.77
Greater course flexibility for faculty	158	3.28	0.74
Opportunity to diversify program offerings	152	3.20	0.78
Access to adequate equipment to support distance education teaching	157	3.18	0.78
Technical support provided by the institution	155	3.13	0.80
Support and encouragement from program director/chair	140	3.09	0.63
Opportunity to enhance/expand my teaching experience	158	3.08	0.70
Part of teaching load	151	3.08	0.72
Support and encouragement from institution's administrators	149	3.06	0.73
Distance education training provided by the institution	153	3.03	0.79

The following steps were taken to reduce Type I errors (Terrell, 2012). Correlation analysis using Pearson's r was conducted on intrinsic and extrinsic factors within and between groups. Only those factors achieving a mean score at or above a 3.0 threshold indicating agreement with a statement were analyzed. This limited the number of tests needed to be run in

an effort to reduce errors. Cohen's (1988) classification of correlations was used to categorize relationships as large (r = 0.50), medium (r = 0.30) and small (r = 0.10).

There was evidence ($p < 0.05$) for positive effects between most intrinsic and extrinsic motivators with means above 3.0 except between the intrinsic motivator 'ability to reach students who cannot come to campus' and the extrinsic motivator 'technical support provided by the institution' ($r = 0.201$, $p = 0.16$), which did not reach a level of statistical significance (see Table 7). A significant medium effect (Cohen, 1988) was seen between 'greater course flexibility for students' and 'support and encouragement from institution's administrators' ($r = 0.484$, $p = 0.000$). Additional significant ($p < 0.05$) medium effects include 'greater course flexibility for students' and 'access to adequate equipment' ($r = 0.481$, $p = 0.000$), and 'greater course flexibility for faculty' and 'distance education training provided by the institution' ($r = 0.456$, $p = 0.000$). Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Table 7

Correlational Analyses of Intrinsic and Extrinsic Motivators

Factors	Greater course flexibility for students	Ability to reach students who cannot come to campus	Greater course flexibility for faculty	Opportunity to diversify program offerings	Opportunity to enhance/ expand my teaching experience
Access to adequate equipment	r = 0.481 p = 0.000** n = 156	r = 0.176 p = 0.034* n = 146	r = 0.442 p = 0.000** n = 155	r = 0.431 p = 0.000** n = 151	r = 0.272 p = 0.001** n = 154
Technical support provided by the institution	r = 0.371 p = 0.000** n = 153	r = 0.201 p = 0.16 n = 144	r = 0.372 p = 0.000** n = 152	r = 0.353 p = 0.000** n = 148	r = 0.378 p = 0.000** n = 153
Support and encouragement from program director/chair	r = 0.259 p = 0.002** n = 138	r = 0.301 p = .001** n = 130	r = 0.406 p = 0.000** n = 137	r = 0.352 p = 0.000** n = 136	r = 0.373 p = 0.000** n = 138
Part of teaching load	r = 0.284 p = 0.000** n = 48	r = 0.292 p = 0.000** n= 143	r = 0.291 p = 0.000** n = 148	r = 0.293 p = 0.000** n = 143	r = 0.296 p = 0.000** n = 147
Support and encouragement from institution's administrators	r = 0.484 p = 0.000** n = 147	r = 0.274 p = 0.001** n = 138	r = 0.442 p = 0.000** n = 146	r = 0.448 p = 0.000** n = 145	r = 0.223 p = 0.007** n = 148
Distance education training provided by the institution	r = 0.420 p = 0.000** n = 151	r = 0.193 p = 0.021* n = 142	r = 0.456 p = 0.000** n = 150	r = 0.381 p = 0.000** n = 146	r = 0.334 p = 0.000** n = 150

Note. * denotes $p < .05$; **denotes $p < .01$

1.1 What intrinsic factors motivate use? Factors deemed intrinsic motivators in this study are consistent with those proposed by Betts (1998, 2014). Table 8 ranks program directors level of agreement for the intrinsic factors impacting use of distance education using a mean of

3.0 as the cutoff for agreement. Means of the intrinsic factors ranged from 2.4 to 3.36. Program directors' selecting 'not applicable' were not included in the analysis resulting in varied response rates. Five of 13 intrinsic motivators achieved at least a 3.0 or higher threshold for 'agreement' based on the four-point Likert scale (see Table 8). The highest ranking intrinsic factor was 'greater course flexibility for students' (mean = 3.36, SD = 0.73, closely followed by 'ability to reach students who cannot come to campus' (mean = 3.33, SD = 0.77). The lowest scoring intrinsic motivator was 'opportunity for grants for research' (mean = 2.4, SD = 0.88).

Table 8

Ranked Order by Mean of Intrinsic Factors Motivating Use of Distance Education with Means at or Above 3.0

Intrinsic Factor	N	Mean	SD
Greater course flexibility for students	159	3.36	0.73
Ability to reach students who cannot come to campus	149	3.33	0.77
Greater course flexibility for faculty	158	3.28	0.74
Opportunity to diversify program offerings	152	3.20	0.78
Opportunity to enhance/expand my teaching experience	158	3.08	0.70

Note. N = Number of Respondents, SD = Standard Deviation

Correlational analyses were limited to intrinsic motivators with means above the 3.0 threshold as shown in Table 9 in an effort to reduce Type I errors (Terrell, 2012). There is evidence ($p < 0.05$) for small to large effects between most intrinsic motivators. Significant large effects (Cohen, 1988) were identified between intrinsic motivators 'greater course flexibility for

students' and 'greater course flexibility for faculty' (r = 0.723, p = 0.000), and between 'greater course flexibility for faculty' and 'opportunity to diversify program offerings' (r = 0.628, p = 0.000). Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Table 9

Correlational Analyses of Intrinsic Motivating Factors

Intrinsic Factor	Greater course flexibility for students	Ability to reach students who cannot come to campus	Greater course flexibility for faculty	Opportunity to diversify program offerings	Opportunity to enhance/ expand my teaching experience
Greater course flexibility for students	r = 1	r = 0.409 p = 0.000** n=147	r = 0.723 p = 0.000** n = 158	r = 0.568 p = 0.000** n = 151	r = 0.296 p = 0.000** n = 155
Ability to reach students who cannot come to campus	r = 0.409 p = 0.000** n = 147	r =1	r = 0.297 p = 0.000** n = 0.000	r = 0.364 p = 0.000** n = 141	r = 0.309 p = 0.000** n =145
Greater course flexibility for faculty	r = 0.723 p = 0.000** n = 158	r = 0.297 p = 0.000** n = 147	r = 1	r = 0.628 p = 0.000** n = 150	r = 0.366 p = 0.000** n = 154
Opportunity to diversify program offerings	r = 0.568 p = 0.000** n = 151	r = 0.364 p = 0.000** n = 141	r = 0.628 p = 0.000** n = 150	r = 1	r = 0.374 p = 0.000** n = 150
Opportunity to enhance/ expand my teaching experience	r = 0.296 p = 0.000** n = 155	r = 0.309 p = 0.000** n = 145	r = 0.366 p = 0.000** n = 155	r = 0.374 p = 0.000** n = 150	r = 1

Note. r = Pearson's Correlation Coefficient; p = probability, n = number of respondents;

**denotes p < .01

1.2. What extrinsic factors motivate use? Extrinsic motivators in this study are consistent with those proposed by Betts (1998, 2014). Table 10 ranks the extrinsic factors impacting use of distance education with means at or above 3.0. Means for extrinsic factors ranged from 2.3 to 3.18. Six of 16 extrinsic motivators scored at or above the 3.0 threshold. The highest scoring extrinsic motivator was 'access to adequate equipment' (mean = 3.18, SD = 0.78). The lowest scoring extrinsic factor was 'recognition and awards,' indicating disagreement with this statement as a motivating factor (mean = 2.30, SD = 0.80).

Table 10

Ranked Order by Mean of Extrinsic Factors Motivating Use of Distance Education with Means at or Above 3.0

Extrinsic Factor	N	Mean	SD
Access to adequate equipment	157	3.18	0.78
Technical support provided by the institution	155	3.13	0.80
Support and encouragement from program director/chair	140	3.09	0.63
Part of teaching load	151	3.08	0.72
Support and encouragement from institution's administrators	149	3.06	0.73
Distance education training provided by the institution	153	3.03	0.79

Note. N = Number of Respondents, SD = Standard Deviation

Correlational analyses were limited to extrinsic motivators with means above the 3.0 threshold as shown in Tables 11 and 12 in an effort to reduce Type I errors (Terrell, 2012). There is evidence ($p < 0.05$) for small to large effects between most extrinsic motivators. Significant

large effects were identified between the extrinsic factors ‘distance education training provided by the institution’ and ‘technical support provided by the institution’ ($r = 0.702$, $p = 0.000$), ‘access to adequate equipment to support distance education teaching’ and ‘technical support provided by the institution’ ($r = 0.636$, $p = 0.000$), and ‘distance education training provided by the institution’ and ‘access to adequate equipment to support distance education teaching’ ($r = 0.613$, $p = 0.000$). Findings indicate results are statistically significant and did not occur by chance with 95 percent confidence.

Table 11

Correlational Analyses of Extrinsic Motivating Factors

Extrinsic Factor	Access to adequate equipment to support distance education teaching	Technical support provided by the institution	Support and encouragement from program director/ chair
Access to adequate equipment to support distance education teaching	r = 1	r = 0.636 p = 0.000** n = 153	r = 0.295 p = 0.000** n = 138
Technical support provided by the institution	r = 0.636 p = 0.000** n = 153	r = 1	r = 0.283 p = 0.001** n = 138
Support and encouragement from program director/ Chair	r = 0.295 p = 0.000** n = 138	r =0.283 p = 0.001** n = 138	r = 1
Part of teaching load	r = 0.258 p = 0.002** n = 147	r = 0.320 p = 0.000** n = 146	r = 0.360 p = 0.000** n = 133
Support and encouragement from institution's administrators	r = 0.577 p = 0.000** n = 147	r = 0.482 p = 0.000** n = 146	r = 0.439 p = 0.000** n = 137
Distance education training provided by the institution	r = 0.613 p = 0.000** n = 152	r = 0.702 p = 0.000** n = 149	r = 0.277 p = 0.001** n = 136

Note. r = Pearson's Correlation Coefficient; p = probability, n = number of respondents;

**denotes p < .01

Table 12

Correlational Analyses of Extrinsic Motivating Factors Continued

Extrinsic Factor	Part of teaching load	Support and encouragement from institution's administrators	Distance education training provided by the institution
Access to adequate equipment to support distance education teaching	r = 0.258 p = 0.000** n = 147	r = 0.577 p = 0.000** n = 147	r = 0.613 p = 0.000** n = 152
Technical support provided by the institution	r = 0.320 p = 0.000** n = 146	r = 0.482 p = 0.000** n = 146	r = 0.702 p = 0.000** n = 149
Support and encouragement from program director/chair	r = 0.360 p = 0.000** n = 133	r = 0.439 p = 0.000** n = 137	r = 0.277 p = 0.001** n = 136
Part of teaching load	r = 1	r = 0.373 p = 0.000** n = 142	r = 0.276 p = 0.001** n = 145
Support and encouragement from institution's administrators	r = 0.373 p = 0.000** n = 142	r = 1	r = 0.479 p = 0.000** n = 145
Distance education training provided by the institution	r = 0.276 p = 0.001** n = 145	r = 0.479 p = 0.000** n = 145	r = 1

Note. r = Pearson's Correlation Coefficient; p = probability, n = number of respondents;

**denotes p < .01

Research question 2: What factors inhibit clinical laboratory science program directors from using distance education? Descriptive statistics including means, frequencies and standard deviations helped answer this question. Inferential statistics included Pearson's correlation coefficient. Research question two addressed all inhibiting factors impacting programs directors' decisions to not use distance education. Of the 20 inhibitors, five ranked

above the 3.0 threshold for agreement with a statement based on the four-point Likert scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). Means for inhibitors ranged from 2.04 to 3.11. 'Concern about quality of courses' was the highest ranking inhibiting factor (mean = 3.11, SD = 0.83). The inhibiting factor program directors most strongly disagreed with was 'lack of recognition and awards' (mean = 2.04, SD = 0.63) followed by 'lack of professional prestige' (mean = 2.21, SD = 0.79). Table 13 ranks the inhibiting factors for all program directors with means above 3.0. Program directors' selecting 'not applicable' were not included in the analysis resulting in varied response rates.

Table 13

Ranked Summary of Factors Inhibiting Directors' from Using Distance Education with Means at or Above 3.0

Variable	N	Mean	SD
Concern about quality of courses	163	3.11	0.83
Lack of adequate equipment to support distance education teaching	154	3.09	0.90
Concern about faculty workload	156	3.03	0.80
Lack of release time	154	3.03	0.80
Concern about quality of students	159	3.01	0.87

Note. N = Number of Respondents, SD = Standard Deviation

Correlational analyses were limited to inhibitors with means above the 3.0 threshold as shown in Table 14 in an effort to reduce Type I errors (Terrell, 2012). Cohen's (1988) classification of correlations was used to categorize relationships as large (r = 0.50), medium (r = 0.30) and small (r = 0.10). There was evidence ($p < 0.05$) for small to large effects for several inhibiting factors. Significant large effects were identified between the inhibitors 'concern about

quality of courses' and 'concern about quality of students' (r = 0.545, p = 0.000), and between 'lack of release time' and 'concern about faculty workload' (r = 0.513, p = 0.000). Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Table 14

Correlational Analyses of Inhibiting Factors

Inhibiting Factor	Concern about quality of courses	Lack of adequate equipment to support distance education teaching	Concern about faculty workload	Lack of release time	Concern about quality of students
Concern about quality of courses	r = 1	r = 0.326 p = 0.000** n = 154	r = 0.044 p = 0.588 n = 156	r = 0.103 p = 0.204 n = 154	r = 0.545 p = 0.000** n = 159
Lack of adequate equipment to support distance education teaching	r = 0.326 p = 0.000** n = 154	r = 1	r = 0.348 p = 0.000** n =149	r = 0.427 p = 0.000** n = 149	r = 0.298 p = 0.000** n = 151
Concern about faculty workload	r = 0.044 p = 0.588 n = 156	r = 0.348 p = 0.000** n = 149	r = 1	r = 0.513 p = 0.000** n = 151	r = 0.159 p = 0.50 n = 153
Lack of release time	r = 0.103 p = 0.204 n = 154	r = 0.427 p = 0.000** n = 149	r = 0.513 p = 0.000** n = 151	r = 1	r = 0.058 p = 0.475 n = 152
Concern about quality of students	r = 0.545 p = 0.000** n = 159	r = 0.298 p = 0.000** n = 151	r = 0.159 p = 0.50 n = 153	r = 0.058 p = 0.475 n = 152	r = 1

Note. r = Pearson's Correlation Coefficient; p = probability, n = number of respondents;

**denotes p < .01

Correlational analysis using Pearson's r was also conducted between all motivators and inhibitors meeting or exceeding the 3.0 threshold. There was evidence ($p < 0.05$) for small effects between the following motivators and inhibiting factors: 'concern for faculty workload' and 'technical support provided by the institution ($r = .236$, $p = 0.004$, $n = 150$), 'opportunity to diversify program offerings' and 'concern about quality of students' ($r = .211$, $p = 0.010$, $n = 149$), and between 'lack of adequate equipment to support distance education teaching' and 'access to adequate equipment ($r = .185$, $p = 0.024$, $n = 149$). Findings indicate results are significant and did not occur by chance with 95 percent confidence. Significant negative relationships were not identified between motivators and inhibitors.

Research question 3: Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience? Descriptive statistics including means, frequencies and standard deviations helped answer this question. Inferential statistics included independent two-tailed t-tests for data analysis. Research question three addressed two groups: those with distance education experience ($n = 89$) and those without distance education experience ($n = 73$) as determined by demographic question four for a sample population of 162 respondents for analysis as one respondent did not respond to the demographic question. Program directors' selecting 'not applicable' were not included in the analysis of each motivating and inhibiting factor resulting in varied response rates.

Intrinsic motivators for directors with and without distance education experience. The top seven intrinsic motivators based on mean values for directors with and without distance education experience are found in Table 15. Means of all intrinsic factors for those with experience ranged from 2.43 to 3.52, and from 2.36 to 3.25 for those without previous distance

education experience. The highest scoring intrinsic motivators for directors with experience were ‘ability to reach students who cannot come to campus’ (mean = 3.52; SD = 0.61), and ‘greater course flexibility for students (mean = 3.52; SD = 0.64). The highest scoring intrinsic motivator for directors without experience was ‘greater course flexibility for faculty’ (mean = 3.25; SD = 0.74). The lowest scoring intrinsic motivator for both directors with and without distance education experience was ‘opportunity for grants for research’ (mean = 2.43 and 2.36 respectively).

Table 15

Top Seven Intrinsic Factors for Directors' With and Without Experience

Rank	With Experience	Without Experience
1	Ability to reach students who cannot come to campus (Mean = 3.52; SD = 0.61; n = 88)	Greater course flexibility for faculty (Mean = 3.25; SD = 0.74; n = 68)
2	Greater course flexibility for students (Mean = 3.52; SD = 0.64; n = 89)	Opportunity to enhance/expand my teaching experience (Mean = 3.20; SD = 0.75; n = 71)
3	Greater course flexibility for faculty (Mean = 3.30; SD = 0.75; n = 89)	Greater course flexibility for students (Mean = 3.16; SD = 0.80; n = 69)
4	Opportunity to diversify program offerings (Mean = 3.24; SD = 0.72; n = 86	Opportunity to diversify program offerings (Mean = 3.14); SD =0.86; n = 65)
5	Overall job satisfaction (Mean = 3.00; SD = 0.77; n = 86)	Ability to reach students who cannot come to campus (Mean = 3.07; SD = 0.88; n = 60)
6	Opportunity to enhance/expand my teaching experience (Mean = 2.99; SD = 0.64; n = 86)	Personal motivation to use technology (Mean = 2.99; SD =0.80; n = 70)
7	Opportunity to diversify my teaching (Mean = 2.97; SD = 0.77; n = 87)	Opportunity to diversify my teaching (Mean = 2.96; SD = 0.81; n = 70)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education,' by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics were limited to the top seven intrinsic factors, half the total, to reduce the number of tests needed to be run in an effort to redue Type I errors (Terrell, 2012). Effect size of statistically significant results were determined by calcuting Cohen's d using an online effect size calculator (Becker, 2000). Cohen's (1988) classification of d values was used to

interpret data: small = 0.2, medium = 0.5, and large = 0.8. Results for the majority of findings were not signficant at a 95 percent confidence interval. There was evidence ($p < 0.05$) for significant differences with medium effects for two intrinsic motivators between directors with and without experience indicating these results were not due to chance with 95 percent confidence: 'ability to reach students who cannot come to campus' ($p = 0.000$, Cohen's $d = 0.596$), and 'greater course flexibility for students' ($p = 0.003$, Cohen's $d = 0.497$).

Extrinsic motivators for directors with and without distance education experience. The top eight extrinsic motivators based on mean values for those with and without distance education experience are found in Table 16. Means for all extrinsic factors ranged from 2.26 to 3.25 for those with experience, and from 2.36 to 3.16 for those without previous distance education experience. The highest scoring extrinsic motivator for those with experience was 'access to adequate equipment (mean = 3.25, SD 0.70). The highest scoring extrinsic motivators for directors without previous distance education experience were 'financial compensation for participation' (mean = 3.16, SD = 0.86) and 'technical support provided by the institution' (mean = 3.16, SD = 0.82). The lowest scoring extrinsic motivator for directors both with and without experience was 'recognition and awards' (mean = 2.26, SD = 0.80; mean = 2.36, SD = 0.80 respectively).

Table 16

Top Eight Extrinsic Factors for Directors' With and Without Experience

Rank	With Experience	Without Experience
1	Access to adequate equipment to support distance education teaching (Mean = 3.25; SD = 0.70; n = 87)	Financial compensation for participation (Mean = 3.16; SD = 0.86; n = 61)
2	Part of teaching load (Mean = 3.17; SD = 0.72; n = 86)	Technical support provided by the institution (Mean = 3.16; SD = 0.82; n = 68)
3	Support and encouragement from institution's administrators (Mean = 3.13; SD = 0.72; n = 86)	Access to adequate equipment to support distance education teaching (Mean = 3.10; SD = 0.86; n = 69)
4	Support and encouragement from program director/chair (Mean =3.13; SD = 0.69; n = 79)	Distance education training provided by the institution (Mean = 3.03; SD = 0.82; n = 66)
5	Technical support provided by the institution (Mean = 3.10; SD = 0.80; n = 86)	Support and encouragement from program director/chair (Mean = 3.03; SD = 0.55; n = 60)
6	Distance education training provided by the institution (Mean = 3.02; SD = 0.78; n = 86)	Requirement by department (Mean = 2.98; SD = 0.83; n = 63)
7	Job security (Mean = 3.01; SD = 0.84; n = 79)	Support and encouragement from institution's administrators (Mean = 2.97; SD = 0.74; n = 63)
8	Requirement by department (Mean = 2.98; SD = 0.83; n = 82)	Part of teaching load (Mean = 2.95; SD = 0.70; n = 64)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education,' by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics for comparison between directors with and without experience was limited to the top eight extrinsic factors to reduce the number of tests needed to be run, thus

reducing Type I errors (Terrell, 2012). The results for the majority of findings were not significant at a 95 percent confidence interval. There was evidence ($p < 0.05$) for one significant difference among the top eight extrinsic factors: 'financial compensation for participation' ($p = 0.015$, Cohen's $d = 0.412$) indicating these results did not occur by chance with 95 percent confidence and are significant.

Inhibitors for directors with and without distance education experience. The top 10 inhibitors based on mean values for those with and without distance education experience are found in Table 17. Means for all inhibitors ranged from 2.01 to 2.95 for those with experience, and from 2.07 to 3.32 for those without previous distance education experience. The top ranked inhibitor for those with previous distance education experience was 'lack of adequate equipment to support distance education teaching (mean = 2.95, SD = 0.94). The top ranked inhibitor for those without previous distance education experience was 'concern about quality of courses' (mean = 3.32, SD = 0.80). The lowest ranking inhibitor for directors both with and without distance education experience was 'lack of recognition and awards' (Mean = 2.01, SD = 0.66; Mean = 2.07, SD = 0.58 respectively).

Table 17

Top Ten Inhibiting Factors for Directors' With and Without Experience

Rank	With Experience	Without Experience
1	Lack of adequate equipment to support distance education teaching (Mean = 2.95; SD = 0.94; n = 84)	Concern about quality of courses (Mean =3.32; SD = 0.80; n = 73)
2	Concern about quality of courses (Mean = 2.94; SD = 0.83; n = 89)	Lack of adequate equipment to support distance education teaching (Mean = 3.26; SD = 0.81; n = 70)
3	Concern about quality of students (Mean = 2.93; SD = 0.87; n = 88)	Concern about faculty workload (Mean = 3.25; SD = 0.79; n = 69)
4	Lack of technical support provided by the institution (Mean = 2.89; SD = 0.84; n = 84)	Lack of release time (Mean = 3.21; SD = 0.81; n = 67)
5	Lack of release time (Mean = 2.87; SD = 0.76; n = 86)	Concern about quality of students (Mean = 3.13; SD = 0.87; n = 70)
6	Concern about faculty workload (Mean = 2.86; SD = 0.77; n = 86)	Lack of technical support provided by the institution (Mean = 3.12; SD = 0.83; n = 69)
7	Lack of distance education training provided by the institution (Mean = 2.81; SD = 0.85; n = 86)	Lack of financial compensation for participation (Mean = 3.05; SD = 0.89; n = 63)
8	Lack of a technological background (Mean = 2.77; SD = 0.86; n = 84)	Lack of distance education training provided by the institution (Mean = 2.98; SD = 0.85; n = 66)
9	Lack of financial compensation for participation (Mean = 2.67; SD = 0.91; n = 86)	Lack of technology incentives for faculty who are involved in distance education (Mean = 2.84; SD = 0.87; n = 63)
10	Lack of support and encouragement from institution's administrators (Mean = 2.52; SD = 0.88; n = 82)	Lack of a technological background (Mean = 2.83; SD = 0.80; n = 70)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education," by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics were limited to the top 10 inhibitors (Terrell, 2012). There is evidence ($p < 0.05$) for significant differences of small to medium effect for several inhibitors as shown in Table 18 below. Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Table 18

Inhibiting Factors with Significant Results

Factor	*t*	Degrees of freedom	P- value	Cohen's d
Concern about faculty workload	3.060	153	0.003**	0.499
Concern about quality of courses	2.882	160	0.004**	0.467
Lack of technology incentives for faculty who are involved in distance education	2.751	127	0.007**	0.457
Lack of release time	2.639	151	0.009**	0.432
Lack of financial compensation for participation	2.493	147	0.014*	0.422
Lack of adequate equipment to support distance education	2.127	152	0.035*	0.352

Note: * denotes $p < .05$; **denotes $p < .01$

Research question 4: Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings?

Descriptive statistics including means, frequencies and standard deviations helped answer this question. Inferential statistics included analysis of Variance (ANOVA) and Bonferroni tests. Research question four addressed three groups based on academic setting obtained by demographic question two of the study questionnaire: educator at a MLS university/college-based program (n = 57), educator at a MLT technical and/or college-based program (n = 75, and

educator at a hospital-based MLS or MLT program (n = 26). Motivating and inhibiting factors were measured on a four-point Likert scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree).

Intrinsic factors for MLS, MLT, and hospital-based program directors. The top seven intrinsic factors based on mean values for educators at MLS, MLT and hospital-based programs are found in Table 19. Means for all intrinsic factors ranged from 2.28 to 3.35 for MLS educators, 2.43 to 3.42 for MLT educators and 2.64 to 3.39 for hospital-based educators. Of the top seven intrinsic factors for hospital-based educators, three had means of 3.0 including 'ability to reach students who cannot come to campus,' 'opportunity to diversify program offerings,' and 'personal motivation to use technology.' The lowest scoring intrinsic factor for all 3 groups was 'opportunity for grants for research.'

Table 19

Top Seven Intrinsic Factors by Academic Setting

Rank	MLS	MLT	Hospital-Based
1	Ability to reach students who cannot come to campus (Mean = 3.35; SD = 0.84; n = 55)	Ability to reach students who cannot come to campus (Mean = 3.42; SD = 0.65; n = 72)	Greater course flexibility for faculty (Mean = 3.39; SD = 0.50; n = 23)
2	Greater course flexibility for students (Mean = 3.32; SD = 0.77; n = 56)	Greater course flexibility for students (Mean = 3.41; SD = 0.74; n = 74)	Greater course flexibility for students (Mean = 3.21; SD = 0.66; n = 24)
3	Greater course flexibility for faculty (Mean = 3.25; SD = 0.77; n = 56)	Greater course flexibility for faculty (Mean =3.26; SD = 0.80; n = 74)	Career exploration (Mean =3.09; SD = 0.61; n = 22)
4	Opportunity to diversify program offerings (Mean = 3.19; SD = 0.75; n = 54)	Opportunity to diversify program offerings (Mean = 3.26; SD = 0.76; n = 69)	Intellectual challenge (Mean = 3.08; SD = 0.76; n = 25)
5	Opportunity to enhance/expand my teaching experience (Mean = 2.95; SD = 0.70; n = 56)	Opportunity to enhance/expand my teaching experience (Mean = 3.18; SD = 0.72; n = 72)	Overall job satisfaction (Mean = 3.08; SD = 0.70; n = 25)
6	Overall job satisfaction (Mean = 2.91; SD = 0.80; n = 55)	Opportunity to diversify my teaching (Mean = 3.03; SD = 0.72; n = 74)	Opportunity to enhance/expand my teaching experience (Mean = 3.04; SD = 0.61; n = 25)
7	Opportunity to diversify my teaching (Mean = 2.89; SD = 0.88; n = 55)	Personal motivation to use technology (Mean = 2.99; SD = 0.85; n = 75)	Ability to reach students who cannot come to campus (Mean = 3.0; SD = 0.87; n = 0.87)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education," by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics including ANOVA and Bonferroni tests were limited to the top seven intrinsic factors, half of the total, to limit the number of tests that needed to be run in order to reduce Type I errors (Terrell, 2012). The results of the majority of intrinsic factors were not significant between academic groups at a 95 percent confidence interval. There was evidence ($p < 0.05$) for a significant difference between groups for the intrinsic factor 'career exploration' (F value = 8.47, $p = 0.000$) via tests of ANOVA. 'Career exploration' was the third highest ranked intrinsic factor for hospital-based educators (mean = 3.09) and was found to differ significantly from both MLS (mean = 2.32) and MLT (2.51) program directors by Bonferroni tests. Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Extrinsic factors for MLS, MLT, and hospital-based program directors. The top eight extrinsic factors based on mean values for educators at MLS, MLT and hospital-based programs are found in Table 20. Means for all extrinsic factors ranged from 2.13 to 3.21 for educators at MLS programs, 2.45 to 3.19 for educators at MLT programs, and from 2.3 to 3.29 for educators at hospital-based programs. The lowest scoring extrinsic factor was 'recognition and awards' for all three groups.

Table 20

Top Eight Extrinsic Factors by Academic Setting

Rank	MLS	MLT	Hospital-Based
1	Part of teaching load (Mean = 3.21; SD = 0.69; n = 53)	Access to adequate equipment to support distance education teaching (Mean = 3.19; SD = 0.81; n = 73)	Distance education training provided by the institution (Mean = 3.29; SD = 0.56; n = 21)
2	Support and encouragement from program director/chair (Mean = 3.17; SD = 0.62; n = 52)	Technical support provided by the institution (Mean = 3.08; SD = 0.90; n = 72)	Technical support provided by the institution (Mean = 3.26; SD = 0.54; n = 23)

3	Access to adequate equipment to support distance education teaching (Mean = 3.13; SD = 0.74; n = 56)	Financial compensation for participation (Mean = 3.07; SD = 0.97; n = 70)	Access to adequate equipment to support distance education teaching (Mean = 3.22; SD = 0.80; n = 23)
4	Technical support provided by the institution (Mean = 3.11; SD = 0.76; n = 55)	Job security (Mean = 3.03; SD = 0.93; n = 68)	Financial compensation for participation (Mean = 3.16; SD = 0.60; n = 19)
5	Requirement by department (Mean = 3.11; SD = 0.78; n = 53)	Support and encouragement from institution's administrators (Mean = 3.01; SD = 0.74; n = 68)	Support and encouragement from program director/chair (Mean = 3.15; SD = 0.49; n = 20)
6	Support and encouragement from institution's administrators (Mean = 3.05; SD = 0.78; n = 55)	Support and encouragement from program director/chair (Mean =3.00; SD = 0.69; n = 64)	Credit toward promotion and/or tenure (Mean = 3.11; SD = 0.90; n = 18)
7	Distance education training provided by the institution (Mean = 3.00; SD = 0.79; n = 56)	Part of teaching load (Mean = 2.99; SD = 0.80; n = 72)	Support and encouragement from institution's administrators (Mean =3.10; SD = 0.54; n = 21)
8	Support and encouragement from dean (Mean = 2.98; SD = 0.81; n = 54)	Distance education training provided by the institution (Mean = 2.97; SD = 0.82; n = 73)	Job security (Mean = 3.09; SD = 0.61; n = 22)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education," by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics including ANOVA and Bonferroni tests were limited to the top eight extrinsic factors, half of the total, to limit the number of tests needed to be run to reduce Type I

errors (Terrell, 2012). No extrinsic factors within the top eight of any group was found to be statistically significant between groups at the 95 percent confidence interval.

Inhibiting factors for MLS, MLT, and hospital-based program directors. The top 10 inhibiting factors based on mean values for educators at MLS, MLT and hospital-based programs are found in Table 21. Means for all inhibiting factors ranged from 1.96 to 3.09 for educators at MLS programs, 2.11 to 3.20 for educators at MLT programs, and from 1.95 to 3.27 for educators at hospital-based programs. The lowest scoring factor by mean score for all educators was 'lack of recognition and awards.'

Table 21

Top Ten Inhibiting Factors by Academic Setting

Rank	MLS	MLT	Hospital-Based
1	Concern about faculty workload (Mean = 3.09; SD = 0.67; n = 55)	Concern about quality of courses (Mean = 3.20; SD = 0.84; n = 75)	Concern about quality of courses (Mean = 3.27; SD = 0.72; n = 26)
2	Lack of release time (Mean = 2.96; SD = 0.74; n = 55)	Concern about quality of students (Mean = 3.14; SD = 0.83; n = 74)	Lack of adequate equipment to support distance education teaching (Mean = 3.27; SD = 0.87; n = 26)
3	Concern about quality of courses (Mean = 2.96; SD = 0.84; n = 57)	Lack of adequate equipment to support distance education teaching (Mean = 3.10; SD = 0.85; n = 71)	Lack of distance education training provided by the institution (Mean = 3.26; SD = 0.62; n = 23)
4	Lack of adequate equipment to support distance education teaching (Mean = 2.96; SD = 0.97; n = 52)	Lack of release time (Mean = 3.04; SD = 0.81; n = 72)	Concern about quality of students (Mean = 3.12; SD = 0.85; n = 24)
5	Lack of technical support provided by the institution (Mean = 2.90; SD = 0.89; n = 52)	Lack of technical support provided by the institution (Mean = 3.03; SD = 0.81; n = 71)	Lack of support and encouragement from departmental colleagues (Mean = 3.09; SD = 0.85; n = 23)

6	Concern about quality of students (Mean = 2.88; SD = 0.92; n = 56)	Concern about faculty workload (Mean = 2.95; SD = 0.90; n = 73)	Lack of technical support provided by the institution (Mean = 3.08; SD = 0.86; n = 25)
7	Lack of a technological background (Mean = 2.79; SD = 0.86; n = 53)	Lack of financial compensation for participation (Mean = 2.89; SD = 0.91; n = 73)	Lack of financial compensation for participation (Mean = 3.05; SD = 0.97; n = 19)
8	Lack of distance education training provided by the institution (Mean = 2.72; SD = 0.90; n = 54)	Lack of distance education training provided by the institution (Mean = 2.87; SD = 0.85; n = 70)	Lack of release time (Mean = 3.05; SD = 0.95; n = 22)
9	Lack of financial compensation for participation (Mean = 2.64; SD = 0.90; n = 53)	Lack of a technological background (Mean = 2.78; SD = 0.84; n = 73)	Concern about faculty workload (Mean = 3.04; SD = 0.83; n = 23)
10	Lack of support and encouragement from dean (Mean = 2.46; SD = 0.93; n = 54)	Lack of technology incentives for faculty who are involved in distance education (Mean = 2.70; SD = 0.82; n = 70)	Lack of a technological background (Mean = 2.92; SD = 0.78; n = 24)

Note. SD = Standard Deviation; n = number of respondents. The format of the table was adopted from "Factors Influencing Faculty Participation & Retention in Online & Blended Education," by Betts, 2014, *Online Journal of Distance Learning Administration*, *17*(1), 1.

Inferential statistics including ANOVA and Bonferroni tests were limited to the top 10 inhibiting factors, half of the total, to limit the number of tests run to reduce Type I errors (Terrell, 2012). The results of the majority of inhibiting factors were not significant between academic groups at the 95 percent confidence interval. There was evidence ($p < 0.05$) for significance via tests of ANOVA between groups for 'lack of support and encouragement from departmental colleagues' (F value = 6.79, p = .002). A Bonferroni test for this factor found

differences between directors at hospital-based programs (mean = 3.09) and both MLS (mean = 2.33) and MLT (mean = 2.49) directors. Findings indicate results are significant and did not occur by chance with 95 percent confidence.

There was also evidence ($p < 0.05$) of significance between groups for the inhibitor 'lack of distance education training provided by the institution' (F value = 3.34, $p = 0.038$). A Bonferroni test for this factor found differences between directors at hospital-based (mean = 3.26) and MLS (mean = 2.72) programs. Findings indicate results are significant and did not occur by chance with 95 percent confidence.

Chapter V: Summary, Conclusions and Recommendations

This section is divided into three main sections: summary, conclusions, and recommendations. The first section summarizes the findings of the research conducted as part of this study. A practical approach was taken for each research question in the conclusion and recommendation sections highlighting the factors most strongly agreed with by analyzing natural breakpoints in mean values indicating those highly ranked were impactful and those following the breakpoint in mean values are less impactful. Additionally, the second section offers conclusions for each of the four research questions drafted for this study based on the literature review and data obtained, and the third section offers recommendations based on the three psychological needs as part of SDT and future studies.

Summary

The nation is experiencing a labor shortage of qualified laboratory professionals including MLS and MLT (American Society for Clinical Pathology, 2004; Carden, Allsbrook & Thomas, 2009; Doby, 2016; Garcia et al., 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011). Reasons for this shortage include an aging population requiring increased medical care, an increased number of baby boomers' set to retire from the profession, academic program closures, and fewer individuals pursuing degrees in the clinical laboratory sciences (American Society for Clinical Pathology, 2004; Bureau of Labor Statistics, 2017; Carden et al., 2009; Doby, 2016; Kaplan & Burgess, 2011; Scott, 2015).

One way to help combat the labor shortage is through the creation of more distance education clinical laboratory science programs; however, research is limited regarding clinical laboratory science program directors experiences with online platforms (Esani, 2010; Freeman, 2010; Hammerling, 2012; Hansen-Suchy, 2011; McCown, 2010; Veldkamp, 2013). No research

could be identified addressing motivating and inhibitory factors impacting clinical laboratory science program directors' decision to use distance education.

The purpose of this study was to examine both motivating and inhibiting factors impacting clinical laboratory science program directors' involvement in distance education at accredited MLS and MLT programs nationwide. Similar studies examined motivators and/or barriers faced by faculty at individual institutions or related allied health fields in relation to distance education participation (Betts, 1998; Betts, 2012; Cook, Ley, Crawford & Warner, 2009; Kowalczyk, 2014); however, none specifically studied the clinical laboratory sciences. The goal of this research is therefore to address the gap in the scientific literature about a lack of research examining such motivating and inhibiting factors for clinical laboratory science program directors.

The research was guided by the following research questions.

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?
2. What factors inhibit clinical laboratory science program directors from using distance education?
3. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience?
4. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings?

Identifying such factors can provide useful information for clinical laboratory science programs transitioning to or considering a transition to online courses/programs. The number of online programs and the number of online students in the U.S is increasing (Allen & Seaman, 2013, 2015). Related allied health programs including speech language pathology, occupational therapy, physical therapy, and clinical psychology have experienced such increases with success (Williams, 2006). Limited data exists, however, examining distance education clinical laboratory science programs (Esani, 2010; Freeman, 2010; Hammerling, 2012; Hansen-Suchy, 2011; McCown, 2010; Veldkamp, 2013). A better understanding of motivating and inhibitory factors impacting clinical laboratory science program directors' participation in distance education could help address the occupational shortage of qualified MLS/MLT professionals.

A quantitative approach was utilized to answer the research questions. The questionnaire used in this study, after seeking permission, was adapted from Betts (1998, 2014). The demographic portion of the instrument was modified to fit the population of MLS and MLT program directors located in academic and/or hospital- based programs. The second portion of the instrument obtained respondents agreement with 29 motivating factors based on a four-point Likert scale, which did deviate from the original (Betts, 1998, 2014) per committee recommendation. The third portion consisted of 20 inhibiting factors utilizing a four-point Likert scale, which also deviated from the questionnaire by Betts (1998, 2014). The motivating and inhibiting factors listed were identical to those used by Betts (2014); however, the instructions to each section were altered to accommodate this research and this information is in Chapter III.

Overall, 163 MLS and MLT program directors responded to the questionnaire for a 35 percent response rate. Thirty-five percent identified as MLS academic, 46 percent MLT academic, 16 percent as MLS or MLT hospital-based, and three percent identified as 'other.' The

mean number of years teaching for MLS, MLT and hospital-based directors was 20.4, 16.8 and 17.4 years respectively. Directors' identifying themselves as a MLS in an academic setting had the most experience with distance education (approximately 75 percent) followed by MLT (approximately 55 percent), and last directors self-identified as hospital-based (approximately 12 percent). Overall, nearly 59 percent of respondents indicated most of their time was dedicated to teaching. Only 15 percent indicated 0-25 percent of their time was dedicated to teaching. Nearly 71 percent of MLT program directors spent at least 50 percent of their time teaching followed by 56 percent of MLS program directors, and approximately 31 percent of hospital-based directors.

Results of this study indicate that as a group, clinical laboratory science directors agree intrinsic factors including 'greater course flexibility for students' (mean = 3.36), 'ability to reach students who cannot come to campus' (mean = 3.33), and 'greater course flexibility for faculty' (mean = 3.28) are most impactful regarding their decision to use distance education. The most agreed with extrinsic factor for clinical laboratory scientists regarded having access to adequate equipment (mean = 3.18). Analyses of inhibiting factors for all directors indicated weak agreement with two factors prior to a breakpoint in mean values: 'concern about quality of courses' (mean = 3.11) and 'lack of adequate equipment to support distance education teaching' (mean = 3.09). As a collective group, clinical laboratory science directors did not agree strongly with inhibiting factors as having been or as potentially being inhibitive to their decision to use distance education.

Clinical laboratory science directors were also divided into groups and analyzed. Research question three divided directors into two groups: those with and those without distance education experience. Directors with experience most strongly agreed with two intrinsic factors as having motivated their decision to use distance education: 'ability to reach students who

cannot come to campus' and 'greater course flexibility for students.' Both factors achieved means of 3.52, and were found to differ significantly ($p < 0.05$) between groups. A considerable breakpoint in mean values was observed for directors with experience following these motivating factors. Directors without experience also agreed most with two intrinsic factors: 'greater course flexibility for faculty' (mean = 3.25) and 'opportunity to enhance/expand my teaching experience' (mean = 3.20), which did differ from the factors agreed with by directors with experience.

Research question four compared three groups: directors in MLS university-based programs, MLT directors in technical/college-based programs, and directors in hospital-based programs. Results indicated both MLS and MLT university/technical college-based programs agreed most with two intrinsic factors: 'ability to reach students who cannot come to campus' (MLS mean = 3.35, MLT mean = 3.42) and 'greater course flexibility for students' (MLS mean = 3.32, MLT mean = 3.41). The most impactful motivating factor for hospital-based directors was "greater course flexibility for faculty' (mean = 3.39). One intrinsic factor, 'career exploration' was found to differ significantly ($p < 0.05$) between hospital-based directors (mean = 3.09) and both MLS directors (mean = 2.32) and MLT program directors (mean = 2.51) via tests of ANOVA and Bonferroni tests. No significant differences were found between groups for extrinsic factors. Two significant differences ($p < 0.05$) were found between groups for inhibiting factors via tests of ANOVA and Bonferroni tests: 'lack of support and encouragement from departmental colleagues' and 'lack of distance education training provided by the institution. Mean values for both inhibiting factors were highest in hospital-based directors indicating directors in hospital settings find these factors to be more inhibiting than their university/college-based counterparts.

Conclusions

Conclusions were drawn for each research question based on the findings of the quantitative data obtained from the Qualtrics survey with connections made to previous research findings and SDT, which served as the theoretical basis for this study.

Research question one. Research question one sought to find factors that motivate program directors to use distance education. The question also contained two subparts to filter out both intrinsic and extrinsic factors. Specifically, the research question stated:

1. What factors motivate clinical laboratory science program directors' decision to use distance education?
    1.1 What intrinsic factors motivate use?
    1.2 What extrinsic factors motivate use?

Section two of the survey listed 29 motivating factors that respondents were asked to select their level of agreement with using a four-point Likert-scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree) as either 'have motivated' or 'would motivate' depending on their level of experience with distance education. Both descriptive statistics including means, frequencies, and standard deviations and inferential statistics including Pearson's correlation coefficient were used to analyze this question.

Eleven of the 29 motivators scored above the 3.0 threshold indicating agreement with these motivators. Those eleven factors based on mean were 'greater course flexibility for students' (3.36), 'ability to reach students who cannot come to campus' (3.33), 'greater course flexibility for faculty' (3.28), 'opportunity to diversify program offerings' (3.20), 'access to adequate equipment' (3.18), 'technical support provided by the institution' (3.13), 'support and encouragement from program director/chair' (3.09), 'opportunity to enhance/expand my teaching

experience' (3.08), 'part of teaching load'(3.08), 'support and encouragement from institution's administrators' (3.06), and 'distance education training provided by the institution' (3.03).

Results for all clinical laboratory science directors indicate the factors most agreed with and therefore most impactful on their motivation to use distance education were three intrinsic factors; 'greater course flexibility for students' (mean = 3.36), 'ability to reach students who cannot come to campus' (mean = 3.33), and 'greater course flexibility for faculty' (mean = 3.28). Eight additional factors were above the 3.0 threshold indicating agreement, however, a breakpoint was observed in mean values after the top three factors indicating additional factors may be less impactful in motivating directors to use distance education.

The two highest-ranking motivators for all program directors were student centered intrinsic factors. Findings indicate clinical laboratory science directors are student centered, and as a collective group value intrinsic over extrinsic factors, which could be emphasized for practical implementation of distance education programs. The first three factors ranked by mean have the most agreement by clinical laboratory science directors prior to experiencing a breakpoint in mean values. This indicates these values are most influential in motivating directors to use distance education. The top three factors relate to the flexibility afforded by distance education for both students and faculty. Flexibility can benefit all students, but especially nontraditional students who are increasingly older than their traditional counterparts in the clinical laboratory sciences (Hansen-Suchy, 2011; Russell et al., 2007). Many nontraditional students have additional responsibilities including family, work, and volunteerism; for which a return to traditional programs is difficult. Distance education opportunities can provide such students with the ability to return to school, and possibly help reduce the labor shortage facing the clinical laboratory sciences (American Society for Clinical Pathology, 2004; Carden,

Allsbrook & Thomas, 2009; Doby, 2016; Garcia, Ali, Soles, & Lewis, 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011).

An analysis of the inhibitors as part of this study indicated program directors are somewhat concerned about the quality of courses, and weakly with the quality of students who complete distance education programs; yet directors are intrinsically motivated by the opportunity distance education provides regarding flexibility and diversification of classes. This indicates directors agree with some aspects of using distance education, but have reservations regarding quality. This could largely be the result of the practical nature of the clinical laboratory sciences. In addition, directors may be in favor of diversification of courses they may teach outside of, but not within the clinical laboratory sciences.

The highest ranked extrinsic factor for all directors by mean was 'access to adequate equipment' (3.18), which was the fifth highest of all motivators. The mean value for this factor is less than the top three motivating factors so its impact for practical purposes in motivating directors may not be as great. Additional extrinsic factors above the 3.0 threshold focused on support, training, and availability of equipment. These factors reflect the technical nature of the clinical laboratory science profession, which heavily utilizes automated instrumentation in the clinical laboratory. Clinical laboratory scientists are diagnosticians working typically behind the scenes. Thus, their level of agreement being low regarding motivators such as recognition and awards is not surprising. Prestige is not something they seem to seek, nor was financial compensation ranked highly by directors either when analyzed as a collective group. 'Part of teaching load,' however, was the fourth highest of ranked extrinsic factors, but only the ninth highest ranked overall. This indicates while they do not necessarily highly value financial

compensation, they do favor distance education being treated similarly to traditional courses by counting toward their teaching loads.

Inferential statistics. Correlation analysis using Pearson's r was conducted on intrinsic and extrinsic factors within and between groups. Only those factors achieving a mean score at or above a 3.0 threshold indicating agreement with a statement were analyzed. There was evidence ($p < 0.05$) for medium effects between several intrinsic and extrinsic motivators, and large effects for several intrinsic factors and several extrinsic factors with means above 3.0 using Cohen's (1988) classification when analyzed within groups.

The results suggest a positive relationship between the intrinsic factor 'greater course flexibility for students' and extrinsic factor 'support and encouragement from institution's administrators' ($r = 0.484$, $r^2 = .234$ $p = 0.000$), indicating both lead to increased motivation for program directors to be involved in distance education. However, it cannot necessarily be inferred that the presence of one will lead to an increase in the other as overall effect size was medium. The coefficient of determination $r^2 = .234$ indicates only approximately 23 percent of the variance was accounted for by these two variables (Osborn, 2006). There may be other forces influencing the relationship between these two variables. For example, results also suggest a positive relationship between 'greater course flexibility for students' and 'access to adequate equipment' ($r = 0.481$, $r^2 = 0.231$, $p = 0.000$). The coefficient of determination $r^2 = .231$ indicates only approximately 23 percent of the variance was accounted for by these two variables (Osborn, 2006). Thus, positive relationships exist, however, causality is not indicated and only a small percentage of variance is explained by the variables together.

A medium positive relationship was also identified between the intrinsic factor 'greater course flexibility for faculty' and the extrinsic factor 'distance education training provided by the

institution' ($r = 0.456$, $r^2 = 0.210$, $p = 0.000$). The coefficient of determination $r^2 = .210$ indicates only approximately 21 percent of the variance was accounted for by these two variables (Osborn, 2006). Research indicates successful implementation of online courses requires faculty training in online teaching methodologies, which can be quite time consuming (Crawford-Ferre & Wiest, 2012; Darling-Hammond, 2000; Vaill & Testori, 2012). If distance education training is provided by the institution, as the results indicate, directors become increasingly motivated to participate in such an endeavor while recognizing they themselves can benefit from increased flexibility. Though the factor 'distance education training provided by the institution' was only the eleventh ranked motivating factor, clinical laboratory science directors do recognize its importance as they did agree with this statement (mean = 3.03).

Results suggest several large relationships (Cohen, 1988) between intrinsic factors including 'greater course flexibility for students' and 'greater course flexibility for faculty ($r = 0.723$, $r^2 = 0.523$, $p = 0.000$). The coefficient of determination $r^2 = .523$ indicates approximately 52 percent of the variance was accounted for by these two variables (Osborn, 2006). Flexibility afforded by distance education is highly regarded by clinical laboratory science program directors, and an increase in one factor may influence the other. This finding has ramifications on the practical implementation of distance education. Both motivators are highly regarded and do seem to influence each other in a positive direction. A large relationship was also found between the intrinsic motivators 'greater course flexibility for faculty' and 'opportunity to diversify program offering' ($r = 0.628$, $r^2 = 0.394$, $p = 0.000$). The coefficient of determination $r^2 = .394$ indicates approximately 39 percent of the variance was accounted for by these two variables (Osborn, 2006). These relationships reinforce the notion that clinical laboratory science directors value the flexibility distance education could or does provide them for motivation to use distance

education. The flexibility distance education offers as recognized by directors could afford them additional time to diversify program offerings including working with web developers and/or increasing technology within classes. These benefits could lead to a lessening of their concerns regarding identified inhibitors such as poor quality of courses.

Correlational analysis also showed large effects between the extrinsic factors 'technical support provided by the institution' and 'distance education training provided by the institution ($r = 0.702$, $r^2 = 0.493$, $p = 0.000$). The coefficient of determination $r^2 = 0.493$ indicates approximately 49 percent of the variation is accounted for by these two variables (Osborn, 2006). A large effect was also found between 'technical support provided by the institution' and 'access to adequate equipment to support distance education teaching ($r = 0.636$, $r^2 = 0.404$, $p = 0.000$). The coefficient of determination $r^2 = .404$ indicates approximately 40 percent of the variation is accounted for by these two variables (Osborn, 2006).

However, these factors are extrinsic in nature, although significant, they are likely to have less impact on directors' motivation to use distance education as compared to the top three ranked intrinsic factors. Results indicate support, training, and having the proper equipment may be important factors for directors to use distance education, although their overall influence may not be as great as that of the three top intrinsic motivators.

Relation to previous literature. The findings of this survey are consistent with those in previous literature. For example, four of the top five motivators in this study for all program directors are found in the top five of all respondents in Betts (2014). The only motivator identified in this study not found in Betts (2014) study was 'opportunity to diversity program offerings' with a mean of 3.20 in this study. Flexibility emerged as a primary motivator for clinical laboratory science directors, which is consistent with the findings in Betts (2014) for

faculty with distance education experience, and a meta-analysis by Al-Salmon (2013) who also found flexibility to be a primary motivator.

Extrinsic motivators in this study were similar to previous studies (Bruner, 2007; Cook et al., 2009) indicating directors were not driven by money or prestige, but rather by having adequate equipment, support, and training. These results are not surprising for educators in health science disciplines tend to put the benefit of others ahead of themselves such as is the nature of healthcare.

The results of this study and previous literature indicate intrinsic motivators heavily influence faculty participation in distance education programs. Previous research has indicated an increase in the valuation of external rewards such technological support, increases in salary/merit increases, release time, and advancement opportunities i.e. tenure amongst some faculty (Cook et al., 2009), which was not strongly reflected in this research when analyzing all program directors. If institutions housing CLS programs wish to increase director participation in distance education understanding and recognizing these motivators could help with faculty buy in.

Relation to SDT. Four of the top five motivators, including the top three factors identified before a breakpoint in mean values, in this study were intrinsic in nature strongly tied to cognitive evaluation theory and goal contents theory in SDT, which by extension relates to the theoretical concept of autonomy in self-determination theory (Ryan & Deci, 2017). Autonomy is the first psychological need in SDT and is concerned with self-regulation i.e. having the freedom to act in accordance with one's own ideals and interests (Ryan & Deci, 2017). The flexibility distance education offers allows directors to pursue their own ideals and interests in general, but also as related to distance education teaching as exhibited by agreement with the factor

‘opportunity to diversify program offerings.’ By extension, increased flexibility for students can also allow them to feel more empowered to complete work when it is convenient for them especially when asynchronous formats are utilized, thus helping to create a sense of autonomy for students.

Two extrinsic factors related to the psychological need for competence in SDT achieved means above 3.0: ‘technical support provided by the institution’ (3.13) and ‘distance education training provided by the institution’ (3.03). Both are extrinsic motivators and according to organismic integration theory, a mini-theory of SDT, extrinsic motivators can be integrated by an individual and made autonomous (Ryan & Deci, 2017). Thus, clinical laboratory science program directors did agree training and support are valued for becoming involved in distance education, motivators which by extension relate to competence or mastery of such an environment (Ryan & Deci, 2017). Once a person achieves competence they are much more likely to be engaged in an activity, and ultimately can achieve autonomy. If a task is viewed as being too difficult to master, competence, and therefore motivation diminish. Mitigating such factors can help lead to motivation and ultimately involvement.

The last need, relatedness, concerns the human need for social connectivity i.e. the need for being cared for and having a sense of belonging and is incorporated into the sixth mini-theory of SDT, relationship motivation theory which stresses interpersonal skill between both individuals and groups (Ryan & Deci, 2017). Relatedness has some importance to program directors as two extrinsic motivators were ranked in the top 10 by mean concerning the psychological need of relatedness: ‘support and encouragement from program director/chair’ (3.09) and ‘support and encouragement from institutions administrators (3.06). The data identifies program directors find it important to have support, but also encouragement from

superiors in their distance education endeavors, although these are not primary motivators. Having such support addresses the need of being cared for and can also help create a sense of belonging; requirements to fulfill the need of relatedness in SDT. Although factors related to support were agreed with by directors and can play a role in motivation to use distance education, their impact is likely less than that of the top three intrinsic motivators as exhibited by mean values for all directors.

Research question two. What factors inhibit clinical laboratory science program directors from using distance education? Research question two sought to find factors inhibiting program directors from using distance education. Section three of the survey listed 20 inhibiting factors that respondents were asked to select their level of agreement with using a four-point Likert-scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree) as either 'have inhibited' or 'would inhibit' depending on their level of experience with distance education. Both descriptive statistics including means, frequencies, and standard deviations and inferential statistics including Pearson's correlation coefficient were used to analyze this question.

Of 20 inhibitors, five factors achieved means above the 3.0 threshold for all directors. The top two appear most influential to inhibiting directors' use of distance education: 'concern about quality of courses' (mean = 3.11) and 'lack of adequate equipment to support distance education teaching' (mean = 3.09). There was a considerable breakpoint in mean values following the top two inhibitors, indicating these additional factors are less impactful on directors' decision to use distance education. If program directors' concerns regarding course quality and having the proper equipment are not mitigated, results indicate they may not be motivated to participate in distance education. The clinical laboratory sciences are very hands-on with practical-based laboratories accompanying didactic lectures, and distance education would

impact this long held approach. The mean time spent teaching for all directors was approximately 18 years, indicating many directors were educated before distance education became commonplace in the U.S. Thus, directors were likely trained in a traditional model, with many still teaching in a traditional model as results indicate i.e. approximately 45 percent do not teach distance education courses via self-report. Research has indicated clinical laboratory science students completing distance courses are not significantly different from traditional students (Freeman, 1995; Hansen-Suchy, 2011; Perry, 2015; Russel et al., 2007). Thus, directors' concerns may not be based in sound data, but rather negative perceptions of distance education possibly due to a lack of direct experience.

Program directors most strongly disagreed with the inhibitor 'lack of recognition and awards' (mean = 2.04) followed by 'lack of professional prestige' (mean = 2.21). Findings indicate clinical laboratory science directors are not concerned with their own image or in receiving accolades. This data helps to reinforce the notion directors are student centered, and as healthcare professionals tend to put others first.

Inferential statistics. Correlational analyses were limited to inhibitors with means above the 3.0 threshold and were conducted between inhibiting factors with other inhibitors, and also between inhibiting factors and motivators. Several significant though small effects were identified between several motivators and inhibitors indicating only a small percentage of the variance was accounted for by the two variables together (Osborn, 2006).

There was strong evidence ($p < 0.01$) for a large effect (Cohen, 1988) between the inhibitors 'concern about quality of courses' and 'concern about quality of students' ($r = 0.545$, $r^2 = 0.297$, $p = 0.000$). The coefficient of determination $r^2 = 0.297$ indicates approximately 30 percent of the variance is accounted for by these two variables (Osborn, 2006). Program

directors view the quality of distance courses/programs to be less than that of traditional courses/programs resulting in a poorer quality student. Previous findings indicate, however, little difference is identified between clinical laboratory science students who complete distance programs versus traditional programs (Freeman, 1995; Hansen-Suchy, 2011; Perry, 2015; Russel et al., 2007). Thus, educating clinical laboratory science directors regarding student success rates in distance programs may help mitigate this concern.

There was also strong evidence for a strong association between 'lack of release time' and 'concern about faculty workload' ($r = 0.513$, $r^2 = 0.263$, $p = 0.000$). The coefficient of determination $r^2 = 0.263$ indicates approximately 26 percent of the variance is accounted for by these two variables (Osborn, 2006). Although these factors did score above the 3.0 threshold their means are lower than the top two inhibitors before a breakpoint in mean values was observed, and are thus likely less impactful on motivation. However, although only weak agreement exists with these statements it appears distance education may be viewed as an extra task needing to be completed rather than an equal to the teaching of traditional courses. This situation represents a strong ideology of institutions. Do they value distance education or do they not? The factor 'lack of release time' was only ranked fourth by all directors, but by extension could be related to the broader climate of institutions. An institution that does not grant release time for staff or faculty involved in distance education imparts a potential lack of respect for distance education.

Relation to previous literature. The results of this study regarding inhibitors are consistent with previous findings. For example, the top five inhibitors in this study match the top five inhibitors in Betts (2014) study when looking at all respondents. The inhibitor 'concern about quality of courses' was the highest ranked inhibitor in this study for all program directors,

and was the highest ranked by faculty lacking distance education experience in Betts (2014) study. Directors in this study also agreed a lack of time can be inhibiting, which is consistent with findings by Beggs (2000) study where 66.9 percent of faculty found a lack of time as a major barrier to their adoption of technology into the classroom, and Bruner (2007) where faculty felt converting traditional courses to distance courses would take considerable time and effort.

Kowalycyzk (2014) addressed barriers faced by radiology educators in the United States regarding distance education. Three major themes emerged in the Kowalycyzk (2014) study: instructional technology training and support barriers, student related barriers, as well as institutional barriers. The greatest barriers identified in the radiologic sciences included a lack of training/lack of instructional technology support, and an overall lack of instructor confidence regarding their ability to use instructional technology. The radiologic sciences are similar to the CLS in that both require clinical applications, and as results indicate directors in both health disciplines face similar barriers.

Previous research indicates faculty are experiencing increased workloads leaving directors little time for training in distance education course/program development (Gous & Roberts, 2015; Jacobs, 2004; Mamiseishvili, 2012; Montero-Hernandez et al., 2014). Although all directors in this study did agree with 'lack of release time' being an inhibiting factor the mean score was only 3.03. This indicates directors are aware of time constraints, but it is not as inhibiting as quality and a lack of equipment.

Relation to SDT. Self-determination theory is predicated on six mini-theories, and is based on three psychological needs: autonomy, competence and relatedness. Thus, inhibitors identified by clinical laboratory science program directors negatively impact their motivation and

counteract motivation theories. Inhibitors need to be minimized to maximize motivation. The mini-theory basic psychological needs theory as part of SDT discusses how imbalances in our psychological needs can alter an individual's mood and behavior and by extension motivation (Ryan & Deci, 2017).

All inhibitors with means above the 3.0 threshold negatively impact the psychological need for competence. For example, directors ranked the inhibitor 'concern about quality of courses' (mean = 3.11) highest of all inhibitors. Students can be negatively or positively impacted by the quality of courses, thus a concern for quality by directors indicated they also have a concern for the quality of students, another inhibitor above the 3.0 threshold. This centers around the ability to achieve mastery or the lack thereof i.e. competence. Competence does motivate, but an absence of competence can inhibit (Ryan & Deci, 2017). For example, when individuals view tasks as being too difficult to master competence diminishes as does motivation. By extension, based on the premise clinical laboratory science directors are student centered, competence is being transferred to the students themselves in this scenario as evidenced by directors' concern for quality for a successful learning experience.

Two inhibiting factors above the 3.0 threshold with weak agreement can be related to the psychological need of autonomy in SDT: 'concern about faculty workload' (mean = 3.03) and 'lack of release time' (mean = 3.03). Autonomy is concerned with self-regulation i.e. having the freedom to act in accordance with one's own ideals and interests (Ryan & Deci, 2017). Program directors' agreement with these two inhibitors indicate concerns about autonomy, though not as much as the need for competence based on mean values for inhibiting factors.

The psychological need for relatedness is also conceptualized with inhibiting factors meeting or exceeding the 3.0 threshold. Relatedness is concerned with a sense of belonging.

Transitioning from traditional formats to online platforms requires a paradigm shift. Part of the shift includes a potential loss for the sense of belonging to the rich history of traditional clinical laboratory science programs. Thus, connectedness may be lost when transitioning to distance programs/courses or by belonging to only a small number of distance programs. As evidenced in this study, few online programs are in existence relative to the number of traditional programs. At the time of this writing, there were 22 accredited online undergraduate MLS programs, 16 online MLT programs, and 23 online MLT to MLS completion programs in the U.S. (American Society for Clinical Laboratory Science, 2017a, 2017b) compared to the number of accredited programs nationwide listed on a national registry: 233 MLS programs, and 239 MLT programs (National Accrediting Agency for Clinical Laboratory Sciences, 2017a). As such, directors involved in distance education programs become a minority, which could lead to a decreased sense of relatedness and by extension decreased motivation.

Research question three. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors with distance education experience versus those without distance education experience? Research question three sought to compare motivating and inhibiting factors between clinical laboratory science directors with and without previous distance education experience based off results from survey sections two and three. Section two listed 29 motivating factors, and section three of the survey listed 20 inhibiting factors respondents were asked to select their level of agreement with using a four-point Likert-scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). Both descriptive statistics including means, frequencies, and standard deviations and inferential statistics including independent sample t-tests and Cohen's d were used to analyze this question.

Motivating factors for directors with and without experience. To limit the number of tests needed to be run and therefore reduce Type I errors (Terrell, 2012), half of the total number of intrinsic factors and extrinsic factors were analyzed for research question three. Analyses were conducted on directors divided into two groups: those with and without previous distance education experience. Findings indicate similar intrinsic and extrinsic factors motivate both groups to use distance education, however, the most influential factors do differ amongst the two groups. Five intrinsic factors and seven extrinsic factors reached means at or above 3.0 indicating some level of agreement for the group with experience. The two highest ranked motivating factors for the group with experience were intrinsic: 'ability to reach students who cannot come to campus' and 'greater course flexibility for students' both of which achieved means of 3.52. A considerable breakpoint in mean values for motivators was observed for directors with experience following the two aforementioned factors, indicating although directors agreed with additional factors by achieving at or above a 3.0 they were less impactful in their motivation to use distance education.

Five intrinsic factors and five extrinsic factors scored above 3.0 for the group without experience. The two highest ranked factors were intrinsic: 'greater course flexibility for faculty' (mean = 3.25) and 'opportunity to enhance/expand my teaching experience' (mean = 3.20). Two additional intrinsic factors 'greater course flexibility for students (mean = 3.16) and 'opportunity to diversify program offerings (mean = 3.14) and two extrinsic factors 'financial compensation for participation' (mean = 3.16) and 'technical support provided by the institution (mean = 3.16) were also identified as being impactful before a considerable breakpoint was observed in mean values. Findings indicate increased flexibility for directors without experience is most impactful in motivating their use of distance education. The additional aforementioned factors likely have

some impact on motivation to use distance education for directors without experience, but the flexibility afforded to faculty by using distance education is most impactful.

Directors without experience do have a favorable view of distance education regarding the flexibility it can afford them, but also potential students; which was the third highest ranked intrinsic motivator. Directors without experience, however, appear more focused on the benefits afforded to themselves over students as opposed to directors with experience. These results may change as they begin to experience distance education. As results indicate, motivating factors may be transient, not static, and influenced by experience levels and are therefore capable of changing over time as experience increases.

The highest scoring extrinsic motivators by mean for directors without previous distance education experience were 'financial compensation for participation' (3.16), and 'technical support provided by the institution (3.16) prior to seeing a considerable breakpoint in means. This indicates directors without experience are more strongly motivated by finances and technical support over other extrinsic motivators. The factor 'financial compensation for participation' did not achieve a 3.0 mean for directors with experience indicating a lack of agreement with this factor. Results indicate directors with experience may have received financial compensation, and thus did not see fit to agree with this statement. Alternatively, once they became involved with distance education they may have found other motivators to be more valued over monetary gain such as access to adequate equipment.

The lowest scoring intrinsic motivator for both directors with and without distance education experience was 'opportunity for grants for research' (mean = 2.43 and 2.36 respectively). This result indicated clinical laboratory science directors focus on their teaching rather than research. This is reinforced by results indicating approximately 58 percent of all

program directors spend at least 50 percent of their time teaching. In addition, the terminal degree level for clinical laboratory scientists is a bachelors degree. Those teaching may not be tenure track, which could also account for the teaching emphasis.

The lowest scoring extrinsic motivator for directors both with and without experience was 'recognition and awards' (mean = 2.26 and 2.36 respectively). This indicates directors are more concerned with their teaching and students rather than receiving personal accolades. These results are not surprising for clinical laboratory science professionals who typically work behind the scenes in clinical settings.

Inferential statistics. Inferential statistics were limited to the top 7 intrinsic motivators to limit the number of tests that needed to be run to reduce Type I errors (Terrell, 2012). Significant differences ($p < 0.05$) were found for two intrinsic motivators between directors with and without experience: 'ability to reach students who cannot come to campus' ($p = 0.000$, Cohen's $d = 0.596$), and 'greater course flexibility for students' ($p = 0.003$, Cohen's $d = 0.497$). Findings indicate results are significant and did not occur by chance with 95 percent confidence. Means for both the aforementioned intrinsic motivators were higher in directors with experience indicating direct experience with distance education has allowed these directors the benefit of observing advantages for students. Results of intrinsic motivators were similar between groups, but with different ranking order indicating the level of agreement with motivating factors may change overtime with experience. Results also indicate directors with experience are more highly motivated by student-centered factors as compared to directors wtihout experience who are motivated by more personal intrinsic motivators.

One significant difference ($p < 0.05$) was found among the top eight extrinsic factors: 'financial compensation for participation' ($p = 0.015$, Cohen's $d = 0.412$), indicating program

directors without experience value monetary compensation more than directors with experience as a motivatig factor for distance education participation. However, as the analysis indicates, this is not a primary motivator. This may be the result of directors with experience already having been financially rewarded for their invovlement and found it to not be that motivating, or they may have found other factors/opportunties distance education offers to be more rewarding including those intrinsic in nature. Alternatively, directors without experience may be initially motivated more so by factors that directly benefit themselves. This is evidenced by their valuing financial compensation and their agreement with their top two intrinsic motivators related to invididual benenfit concerning increased flexibility for faculty and increased opportunities to enhance their teaching experience.

Inhibiting factors for directors with and without experience. Only the top 10 inhibitors were analyzed for research question three. No inhibiting factors were identified in the group of directors with experience above a 3.0 indicating little to no agreement with these factors as being inhibitive toward their decision to use distance education. The group without experience, however, did agree with seven inhibiting factors i.e. achieved 3.0 mean. However, a breakpoint was observed in mean values following the top four: ‘concern about quality of courses’ (mean = 3.32), ‘lack of adequate equipment to support distance education teaching’ (mean = 3.26), ‘concern about faculty workload’ (mean = 3.25), and ‘lack of release time’ (mean = 3.21). Findings indicate these factors are most impactful on directors without experience as to being inhibitory to their decision to use distance education.

Experience may alleviate most inhibitors with regards to distance education for clinical laboratory science program directors. Directors with experience identified a lack of adequate equipment (mean = 2.95) as their highest ranked inhibitor to using distance education, while

concurrently identifying access to adequate equipment (mean = 3.25) as their top extrinsic motivating factor. Lacking the proper equipment may hinder effective distance education programs/courses in their experience. Results also indicate directors with experience at best weakly agree with having concern about the quality of courses (mean = 2.94) and students (mean = 2.93), which is not surprising for a very hands-on technical profession such as the clinical laboratory sciences. These findings, however, do not indicate strong evidence for inhibition of motivation to use distance education for directors with previous distance education experience.

Inferential statistics. Directors lacking distance education experience do view distance education somewhat negatively in relation to the agreed upon factors. The highest ranked factor for directors without experience was 'concern about the quality of courses', which was found to differ significantly ($p < 0.05$) between the two groups though the effect was small to moderate ($p = 0.004$, Cohen's $d = 0.467$). These results indicate directors without experience who agreed with this statement (mean = 3.32) found quality to be a more important inhibitor than directors with experience (mean = 2.94). Directors with experience did rank 'concern about quality of courses' second, though only with weak agreement (mean = 2.94). Results indicate the concern over quality may diminish as directors become experienced in distance education, however, some concerns may remain though its impact is likely minimal.

Significant differences were also found for several additional inhibitors: 'concern about faculty workload' ($p = 0.003$, Cohen's $d = 0.499$), 'lack of technology incentives for faculty who are involved in distance education' ($p = 0.007$, Cohen's $d = 0.457$), 'lack of release time' ($p = 0.009$, Cohen's $d = 0.432$), 'lack of financial compensation for participation' ($p = 0.014$, Cohen's $d = 0.422$), and 'lack of adequate equipment to support distance education' ($p = 0.035$, Cohen's $d = 0.352$). Mean scores for these inhibitors were all higher for the group without experience.

Results indicate directors without previous experience had concerns about increased workloads, and a lack of technological incentives and support not shared by directors with experience. This could be the result of discussions with other faculty/staff involved with distance education or perhaps the result of misconceptions by directors without experience. Additionally, these inhibitors may decrease over time with direct experience with distance education experience as results indicate.

Relation to previous literature. Survey results are consistent with previous studies. For example, comparing top inhibiting factors for directors with and without experience in this study to the results found by Betts (2014) show similarities. The highest ranked inhibitor in this study for directors with experience was identical to that found by Betts (2014) for faculty with experience: 'lack of adequate equipment to support distance education.' In addition, the top five inhibitors identified by Betts (2014) are all found within the top six inhibitors identified as part of this study. This indicates clinical laboratory science directors are similar to other faculty members outside of the profession regarding factors inhibiting motivation. Results are also consistent with findings of other studies where technological, workload, and/or support barriers were identified (Al-Salman, 2013; Beggs, 2000; Betts, 1998, 2014; Bruner, 2007; Cook et al., 2009; Kowalczyk, 2014; Lloyd et al., 2012; Porter & Graham, 2016, Schifter, 2000).

Relation to SDT. Results indicate intrinsic factors involving flexibility and diversity in teaching and program options are valued by directors with and without experience. These factors are relatable to the psychological need of autonomy. With increased flexibility and diversity, an individual is likely to feel freedom and self-regulated; important components of autonomy.

Extrinsic factors are mixed in their relation to the psychological needs. For example, the top extrinsic factor by mean for directors with experience was 'access to adequate equipment'

(3.25) while for directors without experience it was ‘financial compensation for participation.’ The former can be related to the psychological need for competence as equipment and knowledge of how to work it is vital to mastery. The latter extrinsic factor is related to the psychological need for autonomy as financial independence can impact one’s overall feeling of freedom.

Not a single inhibitor achieved the 3.0 level for directors with experience indicating only weak agreement at best with these factors. However, in examining the top 10 ranked inhibiting factors for both directors with and without experience it becomes evident they are relatable to the psychological need for competence (Ryan & Deci, 2017). Competence is concerned with mastery, but also effectance as described by White (as cited in Ryan & Deci, 2017) referring to our need to interact with and impact our environment. Effectance seems a logical extension for a practical profession such as the clinical laboratory sciences. Inhibitors ranked by both groups include concerns about quality and training; both of which by extension can be related to mastery. Successful distance courses/programs require time, training, and technology and these factors may also be required for mastery.

Research question four. Are there differences in motivating and/or inhibitory factors between clinical laboratory science program directors at different academic settings? Research question four sought to compare motivating and inhibiting factors between clinical laboratory science directors based on programmatic setting creating three groups: MLS academic, MLT academic, and MLS/MLT hospital-based. Findings were based off results from survey sections two and three. Section two listed 29 motivating factors, and section three of the survey listed 20 inhibiting factors that respondents were asked to select their level of agreement with using a four-point Likert-scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). Both

descriptive statistics including means, frequencies, and standard deviations and inferential statistics including analysis of variance (ANOVA) and Bonferroni tests were used to analyze this question.

Motivating factors for directors at MLS and MLT academic and hospital-based programs. To limit the number of tests needed to be run and therefore reduce Type I errors (Terrell, 2012), the total number of intrinsic and extrinsic factors were analyzed for research question four. Additional analysis was conducted on directors divided into three groups based on program setting: MLS academic, MLT academic, and hospital-based program directors. The top five intrinsic motivators were identical between MLS and MLT directors though mean values varied. Comparing the top five intrinsic between MLS and MLT to hospital-based directors did show considerable differences in factor rankings.

There were two ranked motivators, both intrinsic, for MLS program directors identified before a breakpoint in mean values was observed: 'ability to reach students who cannot come to campus' (mean = 3.35), and 'greater course flexibility for students' (mean = 3.32). A breakpoint in mean values was observed in MLS program directors following the top two aforementioned factors indicating these factors are most impactful in motivating these directors' decision to use distance education. The highest ranked extrinsic motivator for MLS program directors was 'part of teaching load' (mean = 3.21), with a mean value less than the top two motivating factors. Results indicate MLS program directors are student centered, and value the flexibility distance education provides. In addition, they do not find extrinsic factors as impactful in their use of distance education.

There were two ranked motivators, both intrinsic, for MLT program directors identified before a breakpoint in mean values was observed: 'ability to reach students who cannot come to

campus' (mean = 3.42), and 'greater course flexibility for students' (mean = 3.41). These factors were ranked identical to MLS program directors, but with different means indicating differences in the level of agreement. A considerable breakpoint was observed in the next highest ranked motivator also intrinsic 'greater course flexibility for faculty' (mean = 3.26). The highest ranked extrinsic motivator for MLT program directors was 'access to adequate equipment to support distance education teaching (mean = 3.19), which is considerably less than the top motivators. Results indicate MLT program directors, similar to MLS directors, find student-centered intrinsic factors to be most impactful on their decision to use distance education.

There was one ranked motivator, intrinsic in nature, for hospital-based program directors identified before a breakpoint in mean values was observed: 'greater course flexibility for faculty' (mean = 3.39). The next highest ranked motivator was extrinsic: 'distance education training provided by the institution' (mean = 3.29), closely followed by another extrinsic motivator 'technical support provided by the institution' (mean = 3.26). Findings indicate some differences in motivating factors for hospital-based directors when compared to MLS and MLT program directors. The latter were motivated by student-centered factors, while the hospital-based group agreed an individual focused factor was most impactful on their motivation. This could be the result of culture differences between institutions. For example, demographic data indicated only approximately 12 percent of hospital-based directors had any distance education teaching experience, while approximately 75 percent of MLS and 55 percent of MLT directors had experience. This indicates hospital-based directors are less familiar with distance education, and see it as an opportunity for growth and development more than their academic counterparts who have had more exposure.

Results indicate similar extrinsic motivators for all three groups based on academic setting, but in different ranked orders. All groups found support and encouragement, technical support/access to equipment, and training to be motivators. Two factors standout, however, as related to financial compensation and job security, which were ranked in the top eight by both MLT directors and hospital-based directors, but not by MLS directors. Though not significant, these results were interesting. These two factors for both MLT and hospital-based directors did score over 3.0 indicating agreement with these factors as being motivating for the use of distance education. Directors in university-based MLS programs not only did not rank them in the top eight, they did not exceed a 3.0 threshold. This could be the result of culture variations amongst the settings. For example, in four-year university settings the three pillars of teaching, service and research are typically emphasized while in two-year colleges/universities and hospital-based settings professional practice may be more highly regarded. Thus, MLS directors at universities may envision activities such as service and research as leading to job security more so than distance education.

Inferential statistics. There was evidence ($p < 0.05$) for a significant difference between groups for the intrinsic factor 'career exploration' (F value = 8.47, $p = 0.000$) via tests of ANOVA. 'Career exploration' was the third highest ranked intrinsic factor for hospital-based educators (mean = 3.09) and was found to differ significantly from both MLS (mean = 2.32) and MLT (mean = 2.51) program directors by Bonferroni tests. Findings indicate results are significant and did not occur by chance with 95 percent confidence. Though significant, this factor with a mean value of 3.09 is likely not that impactful even for hospital-based directors as the mean value is well below their highest ranked motivator 'greater course flexibility for

faculty' (mean = 3.39). No statistically significant differences were identified among extrinsic factors for the three academic groups when analyzing the top eight factors.

Inhibiting factors for directors at MLS and MLT academic and hospital-based programs. To limit the number of tests needed to be run and therefore reduce Type I errors (Terrell, 2012), half (10) of the total number (20) of inhibiting factors were analyzed for research question four. One inhibiting factor was agreed with by MLS program directors, five by MLT program directors, and nine by hospital-based program directors (based on mean values at or above 3.0). The highest ranked inhibitor for MLS directors was 'concern about faculty workload' (mean = 3.09). The highest ranked inhibitor by MLT directors before seeing a breakpoint in mean values was 'concern about quality of courses' (mean = 3.20). Three inhibitors were identified before a breakpoint in mean values was observed for hospital-based program directors: 'concern about quality of courses (mean = 3.27), 'lack of adequate equipment to support distance education teaching' (mean = 3.27), and lack of distance education training provided by the institution' (mean = 3.26). Findings indicate hospital-based directors agree multiple inhibitors would negatively impact their decision to use distance education including reduced quality and a lack of equipment and training. Directors in MLT college-based programs did agree the quality of courses would impact them, and directors in MLS programs weakly agreed with their highest ranked inhibitor regarding workload as being inhibiting.

The inhibitors identified by each of the three groups are similar, but with varied rankings and varied mean values. Mean rankings for inhibitors reflect experience levels with distance education: 12 percent of hospital-based directors, 55 percent of MLT directors, and 75 percent of MLS directors had experience. Thus, MLS directors have the most experience with distance education and likewise view factors as being less inhibitive than their MLT and hospital-based

counterparts. Directors in hospital-based programs have the least experience and agree with more inhibitors than the two academic-based groups.

Directors in all three groups based on programmatic setting did rank factors such as work load/lack of time, quality of students/courses, technical equipment and training issues, and lack of support within their top 10. However, only one inhibiting factor reached a 3.0 or higher for MLS academic directors 'concern about faculty workload' (mean = 3.09) indicating agreement. Results indicate directors at MLS programs are weakly concerned about workload, while MLT and hospital-based directors the quality of courses. This could be related to directors at MLS having additional pressures put on them by institutional standards in the form of service and research than the other two groups and distance education is seen as adding to their workload. As MLS directors are more experienced as results indicate, they may have less worries about quality as they have more direct experience allowing for the possible collection of institutional data comparing students from traditional models versus distance education models. In addition, as more MLS directors have direct experience, they may also be more aware of the literature concerning distance education and the quality of students it produces (Freeman, 1995; Hansen-Suchy, 2011; Perry, 2015; Russel et al., 2007).

Inferential statistics. Inferential statistics including ANOVA and Bonferroni tests were limited to the top 10 inhibitors to reduce Type I errors (Terrell, 2012). Two inhibiting factors were significant via tests of ANOVA: 'lack of distance education training provided by the institution' (F value = 3.34, p = 0.038) and 'lack of support and encouragement from departmental colleagues' (F value = 6.79, p = .002). A Bonferroni test found a significant difference between means for directors at MLS (mean = 2.72) and hospital-based programs (mean = 3.26) for the factor 'lack of distance education training provided by the institution.'

Results indicate directors in hospital-based programs view training to be an important component to distance education; more so than their MLS counterparts. As so few hospital-based directors are involved in distance education (approximately 12 percent) the infrastructure and training programs are likely lacking as distance education is not readily utilized.

Significant differences were found between educators at hospital-based programs (mean = 3.09) and both MLS (mean = 2.33) and MLT (mean = 2.49) directors for the factor 'lack of support and encouragement from departmental colleagues' via Bonferroni tests. This indicates directors in hospital-based programs may have a favorable view of distance education as evidenced by their agreement with multiple intrinsic and extrinsic motivators, yet they do not feel colleagues in the hospital setting are supportive of such an educational style. Likely stemming from the fact the clinical laboratory sciences are a heavily hands-on profession based in traditional programs. Many of the colleagues in the hospital setting were likely trained in traditional settings and may not recognize the quality of students coming from such programs (Freeman, 1995; Hansen-Suchy, 2011; Perry, 2015; Russel et al., 2007). In addition, directors in academic settings did not find a lack of support from colleagues to be an agreed upon inhibitor possibly resulting from distance education becoming increasingly popular and/or more widely utilized in university and technical colleges in general (Allen & Seaman, 2013, 2015).

Relation to previous literature. Results of this study indicate a mix of intrinsic and extrinsic factors motivate clinical laboratory science program directors to use distance education for all three academic settings consistent with previous studies of faculty members (Beggs, 2000; Betts, 2014; Lloyd et al., 2012; Porter & Graham, 2016; Schifter, 2000). All three groups most strongly agreed with an intrinsic motivator. The intrinsic motivator 'greater course flexibility for faculty' (mean = 3.39) was the highest ranked motivator by mean for hospital-based directors,

however, the next three highest motivators by mean were extrinsic: ‘distance education training provided by the institution’ (3.29), ‘technical support provided by the institution’ (3.26), ‘access to adequate equipment to support distance education teaching’ (3.22), indicating extrinsic factors are regarded as motivators for this group.

No previous literature could be identified as part of this study specifically addressing motivating and inhibiting factors for educators in the clinical laboratory sciences. The analysis of three groups of clinical laboratory science directors by programmatic setting as part of this study reveals results consistent with previous studies (Beggs, 2000; Betts, 2014; Kowalycyk, 2014; Lloyd et al., 2012; Porter & Graham, 2016; Schifter, 2000) that found motivators including flexibility were highly valued as were training and financial compensation. Inhibitors as part of this analysis were also consistent with previous studies finding agreement with statements of inhibitors such as increased workloads, lack of release time, lack of technical support and/or lack of training provided by institutions (Beggs, 2000; Betts, 2014; Kowalycyk, 2014; Lloyd et al., 2012; Porter & Graham, 2016; Schifter, 2000).

Relation to SDT. The psychological needs of autonomy, competence and relatedness became apparent in analyzing intrinsic and extrinsic motivators and inhibitors by academic setting. Autonomy is concerned with self-regulation i.e. having the freedom to act in accordance with one’s own ideals and interests (Ryan & Deci, 2017). Autonomy recognizes humans can have external pressures exerted upon them acting as impediments to one’s autonomy. Competence is concerned with a human’s feeling mastery and effectance, which as described by White (as cited in Ryan & Deci, 2017) refers to the human tendency to interact or explore their environment along with the tendency to influence that environment. Relatedness concerns the human need for social connectivity i.e. the need for being cared for and having a sense of

belonging (Ryan & Deci, 2017). Lacking any of the above needs can negatively impact one's motivation (Ryan & Deci, 2017).

Many of the intrinsic factors identified by all three groups: MLS academic, MLT academic, and hospital-based are relatable to the psychological need for autonomy. Results indicate greater course flexibility for both faculty and students was agreed with by all three groups. Flexibility relates to autonomy in that it can afford an individual more freedom and self-regulation, major components of this need. Successful distance education does require training and considerable effort to set up. However, once established directors are afforded more freedom in picking their teaching schedule especially if asynchronous formats are utilized. Directors utilizing distance education now have the ability more so to decide where and when they want to teach allowing for more self-regulation. This could free up time for additional opportunities for service and research.

Several extrinsic factors within the top 10 for all three groups are relatable to the psychological need for competence in SDT: 'technical support provided by the institution, 'access to adequate equipment,' and 'distance education training provided by the institution.' A lack of any of these may inhibit program directors in all three settings as they relate to a feeling of mastery. The psychological need for relatedness is also evident for all three groups in agreeing with statements relating to support and encouragement especially from superiors. Without this support, directors are likely to be less motivated to use distance education. Creating a sense of connectedness within the institution is important.

Results of this study indicate both MLT and hospital-based directors agree with more factors as being inhibitive as compared to MLS directors. According to the mini-theory basic psychological needs theory as part of SDT any deficiencies of the three psychological needs can

become damaging to an individual (Ryan & Deci, 2017). Therefore, mitigating inhibiting factors for all three groups is important to motivation. Inhibitors ranked in the top 10 by all three groups included time/workload concerns, quality, lack of training/equipment, and lack of support. Concerns, which relate to all three psychological needs as part of SDT. People need to feel free and have the ability to self-regulate; while also having the time to master the craft that is distance education while being supported and encouraged to do so.

Recommendations

This study attempted a census of all clinical laboratory science program directors listed on a national registry of accredited MLS and MLT programs in both university/college-based and hospital-based settings (NAACLS, 2017a). Results of this study can be utilized by clinical laboratory science directors in their continued use or adoption of distance education. Opportunities exist for increasing the number of distance education clinical laboratory science programs, which could help address the labor shortage of laboratory professionals (American Society for Clinical Pathology, 2004; Carden, Allsbrook & Thomas, 2009; Doby, 2016; Garcia, Ali, Soles, & Lewis, 2015; Kaplan & Burgess, 2011; Ledeboer & Dallas, 2014; Scott, 2015; Szabo, 2011).

The results of this study could prove especially useful for directors looking to increase their online course offerings and/or looking to transition to or create distance education programs. However, this data could also be useful to other groups/stakeholders who would likely become involved in the transition to or creation of distance courses/programs by clinical laboratory science directors including admissions, registration, faculty in the program, financial aid, library services, and career services. Recommendations were made based on survey data and

broken down by the three psychological needs as set forth by SDT: autonomy, competence, and relatedness (Ryan & Deci, 2017).

Autonomy. In relation to the psychological need for autonomy with regards to freedom and self-regulation the following is recommended (Ryan & Deci, 2017). Results from this study indicate clinical laboratory science directors agree intrinsic motivating factors relatable to the psychological need for autonomy are most impactful regarding their decision to use distance education. These results were found for the collective group, but also for group comparisons of directors with and without experience and based on program setting. The researcher recommends factors relatable to the psychological need for autonomy be emphasized to help ensure successful implementation of distance education by clinical laboratory science directors. This included factors relatable to flexibility and those with a student-centered focus. Emphasizing such factors may help with the successful implementation of distance education, but additional research also needs to be conducted as other factors could be impactful not covered as part of this research. Also, emphasizing such factors will not ensure success especially as group comparisons did reveal some differences in motivating factors.

Competence. The psychological need for competence is related to the concept of mastery (Ryan & Deci, 2017). By extension this can be related to extrinsic factors and inhibitors related to equipment and training. The impact such factors would have on motivating one to use distance education was more strongly agreed upon by both directors without experience and directors in hospital-based programs when compared to other groups. Both of these groups did mostly agree with intrinsic motivators, however, extrinsic motivators were also agreed with and one significant difference ($p < 0.05$) between extrinsic motivators was found for directors with and without experience regarding ‘financial compensation for participation.’

Significant differences were also found between groups in both group comparisons of inhibitors concerning factors such as training and/or technical support. These factors are relatable to the psychological need for competence as directors without experience and directors in hospital-based programs have less experience with distance education and appear to agree mastery does have some level of importance for them. These findings are in agreement with the literature indicating training becomes increasingly important as more universities nationwide continue increasing online course and program offerings (Allen & Seaman, 2013, 2015). Based on results of this study the researcher recommends that program directors be aware of their own experience and institutional setting as results indicate such factors can make a difference in motivating factors impacting their decision to use distance education. Program directors could also disseminate this information to other potential stakeholders involved in the transition or creation of distance education courses/program by clinical laboratory science directors: admissions, registration, faculty in the program, financial aid, library services, and career services. Such information can prove useful in the use of distance education within the clinical laboratory sciences and could help with successful implementation.

Relatedness. The psychological need for relatedness concerns the human need for social connectivity i.e. the need for being cared for and having a sense of belonging (Ryan & Deci, 2017) and is reflected in extrinsic factors and inhibitors related to support. Although these factors mean values were not the highest ranked, they often did have a level of agreement indicated by program directors as a whole and in group comparisons. As results indicate inhibitors with means above the 3.0 threshold related to support negatively impact directors' motivation to use distance education as related to the psychological need for relatedness. This was especially true for the group without experience and for directors in hospital-based programs, who as

demographic data indicated only 12 percent had previous experience with distance education when in hospital-based settings.

Based on the results the researcher recommends program directors and other stakeholders try and limit such inhibitors to help with the implementation of distance education by clinical laboratory science program directors while being cognizant of experience level and program setting. In addition, adequate infrastructure, a support network both technologically and via superiors and colleagues can help lessen these factors. Emphasizing intrinsic motivators relatable to the need for relatedness such as reaching students who cannot otherwise come to campus is also recommended.

Recommendations for further study. This research did address MLS and MLT program directors at the national level. However, the study focused specifically on program directors and not MLS and MLT educators in general. Thus, the data though generalizable to program directors may not be generalizable to all educators in the clinical laboratory sciences. The majority of respondents still teach, however, they are likely to engage in more administrative tasks than non-program directors, and their perceptions may not represent that of staff or faculty in MLS and MLT programs. The researcher recommends that future studies try targeting MLS and MLT educators, and not just program directors.

The present study also addressed the use of distance education in general and not just as related to the clinical laboratory sciences. This was done intentionally to try and increase sample size to make the data more generalizable for at the time of this writing very few accredited online programs were in existence. Thus, respondents may have different perceptions of program specific courses that traditionally require extensive practical training. In addition, a qualitative

component could have added richness to the data, and afforded additional insight quantitative methods alone could not.

This study focused on directors and did not address an important component involved in the successful implementation of distance education in the clinical laboratory sciences, that of its students. It is recommended future studies address motivation within clinical laboratory science students themselves regarding willingness to participate in distance education in general and in clinical laboratory science courses specifically.

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Appendix A: Permission Email

From: "Brooks, Reed" <brooksr5262@my.uwstout.edu>
Date: Tuesday, June 20, 2017 at 1:38 PM
To: Kristen Betts <ksb23@drexel.edu>
Subject: Permission request

Dear Dr. Betts,

I am a doctoral student at UW-Stout and I am beginning the groundwork for my dissertation. I came across your article "Build It But Will They Teach?: Strategies for Increasing Faculty Participation & Retention in Online & Blended Education" and I was hoping to receive permission to use your 29 motivating and 29 inhibitory factors as part of a survey I would like to disseminate to faculty in Clinical Laboratory Science programs either in the Midwest or possibly at the national level.

Sincerely,

Reed Brooks

Betts,Kristen <ksb23@drexel.edu>
Reply all

Thu 6/22/2017 9:43 AM
To: Brooks, Reed

Reed,

Thank you for your email. It is great to see you are focusing your research on such an important topic. I am attaching all three surveys for you from my 2014 study which were updated from the original dissertation study in 1997. I am also including two articles that I authored and co-authored based on the more recent study. Between the original study and the 2014 study, there have been 57 studies in which other researchers from across the United State and internationally have used the surveys or parts of the surveys. I grant you permission to use or modify the surveys as needed for your research. The only request would be that my work is cited in your research. Please keep in mind that there are parts of the surveys that are very customized for my previous institution so you can simply use or modify sections that will assist you with your dissertation.

Let me know if you have any questions.

Wishing you all the best with your research!

Sincerely,

Kristen Betts – two articles are below

Betts, K., & Heaston, A. (2014). Build it but will they teach?: Strategies to increase faculty participation and retention in online & blended learning. Online Journal of Distance Education Administrators, 17(2).

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Dr. Kristen Betts
Clinical Professor
EdD Program in Educational Leadership & Management
MS Program in Higher Education

Drexel University
School of Education
3141 Chestnut Street
Philadelphia, PA 19104

Appendix B: List of Intrinsic and Extrinsic Motivators

Intrinsic Motivators:

- Personal motivation to use technology.
- Opportunity for scholarly pursuit
- Opportunity for grants for research
- Intellectual challenge
- Overall job satisfaction
- Career exploration
- Greater course flexibility for students
- Greater course flexibility for faculty
- Opportunity to diversify program offerings
- Ability to reach students who cannot come to campus
- Opportunity to diversify my teaching
- Opportunity to increase access to students with disabilities
- Opportunity to enhance/expand my teaching experience

Extrinsic Motivators

- Release time (e.g., reduced teaching load)
- Requirement by department
- Support and encouragement from dean
- Job security
- Financial compensation for participation (e.g., stipend, overload)
- Support and encouragement from program director/chair
- Institutional pressure/expectation
- Support and encouragement from departmental colleagues
- Part of teaching load (assigned courses to teach)
- Technical support provided by the institution
- Credit toward promotion and/or tenure
- Distance education training provided by the institution
- Recognition and awards
- Access to adequate equipment (e.g., computer, software, etc.) to support distance education teaching
- Support and encouragement from institution's administrators
- Technology incentives for faculty who are involved in distance education (e.g., Laptop, iPad other hardware, software, etc.)

Appendix C: Institutional Review Board Approval

December 7, 2017

Reed Brooks
EdD Graduate Student
University of Wisconsin-Stout

RE: Factors Impacting Clinical Laboratory Science Program Directors'/Educators' Decision to Use Distance Education

Dear Reed:

The IRB has determined your project, *"Factors Impacting Clinical Laboratory Science Program Directors'/Educators' Decision to Use Distance Education"*, is **Exempt** from review by the Institutional Review Board for the Protection of Human Subjects. The project is exempt under **Category #2/3** of the Federal Exempt Guidelines and holds for 5 years. Your project is approved from **December 7, 2017** through **December 6, 2022**. If a renewal is needed, it is to be submitted at least 10 working days prior to the approvals end date. Should you need to make modifications to your protocol or informed consent forms that do not fall within the exemption categories, you will need to reapply to the IRB for review of your modified study.

Informed Consent: All UW-Stout faculty, staff, and students conducting human subjects' research under an approved "exempt" category are still ethically bound to follow the basic ethical principles of the Belmont Report: 1) respect for persons; 2) beneficence; and 3) justice. These three principles are best reflected in the practice of obtaining informed consent from participants.

If you are doing any research in which you are paying human subjects to participate, a specific payment procedure must be followed. Instructions and form for the payment procedure can be found at (insert hyperlink).

If you have questions, please contact the IRB office, and your question will be directed to the appropriate person. I wish you well in completing your study.

Sincerely,

Elizabeth Buchanan
Interim Director of Office of Research and Sponsored Programs and Human Protections Administrator,
UW-Stout Institutional Review Board for the Protection of Human Subjects in Research (IRB)

Appendix D: Clarification of Motivating/Inhibiting Factors Email

Hi Dr. Betts,

I am getting close to being able to collect data with your instrument for my dissertation, and I was hoping just to clarify those items you treated as being intrinsic motivators. From reading your papers I believe the below are intrinsic motivators, but I was wondering about " opportunity for grants for research." Did you treat this as intrinsic or extrinsic?

Again, thank you so much for you time and allowing me to use your instrument.

Below are what I have listed as being intrinsic:

1. Personal motivation to use technology
2. Opportunity for scholarly pursuit
3. Intellectual challenge
4. Overall job satisfaction
5. Career exploration
6. Greater course flexibility for students
7. Greater course flexibility for faculty
8. Opportunity to diversify program offerings
9. Ability to reach students who cannot come to campus
10. Opportunity to diversify my teaching
11. Opportunity to increase access to students with disabilities
12. Opportunity to enhance/expand my teaching experience

Sincerely,

Reed Brooks

Reed,

It is wonderful to hear from you. Yes, the ones you have identified do fall under the intrinsic factors. You will see that most come from the GW study and just a few more were added based on focus groups we conducted. Also, there were actually 30 factors and not 29 for the study. Unfortunately, when we ran the study, one of the questions did not show up on the online survey so we could not include it in the final report. Here is the full list below. I think I sent you all three studies. I share this so you are able to include all 30 :)

Best of luck!

Dr. Betts

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	NA
1. Personal motivation to use technology						
2. Opportunity for scholarly pursuit						
3. Release time (e.g., reduced teaching load)						
4. Requirement by department						
5. Support and encouragement from dean						
6. Job security						
7. Financial compensation for participation (e.g., stipend, overload)						
8. Support and encouragement from program director/chair						
9. Institutional pressure/expectation						
10. Opportunity for grants for research						
11. Support and encouragement from departmental colleagues						
12. Intellectual challenge						
13. Overall job satisfaction						
14. Part of teaching load (assigned courses to teach)						
15. Technical support provided by the institution						
16. Career exploration						
17. Credit toward promotion and tenure						
18. Distance education training provided by the institution						
19. Greater course flexibility for students						
20. Greater course flexibility for faculty						

21. Opportunity to diversify program offerings						
22. Recognition and awards						
23. Ability to reach students who cannot come to campus						
24. Opportunity to diversify my teaching						
25. Access to adequate equipment (e.g., computer, software, etc.) to support distance education teaching						
26. Support and encouragement from institution's administrators						
27. Opportunity to increase access to students with disabilities						
28. To support University System of Georgia in increasing the number of available online courses to students across the state						
29. Technology incentives for faculty who are involved in distance education (e.g., Laptop, iPad other hardware, software, etc.)						
30. Opportunity to enhance/expand my teaching experience						

Hi Dr. Betts,

Great, thank you so much. I was wondering why 29 were listed in the 2014 paper, but 30 were in the ones you had sent. That clears that up. I just want to make sure I get it correct in my dissertation, you did consider 'opportunities for grants for research' as being intrinsic based on your focus groups?

Again, thank you so much for all your help. Have a great weekend.

Reed

Fri 9/29/2017, 9:07 AM

Reed,

The concept of grants was an interesting discussion since some of the tenure track faculty saw grants as being part of their position and something they had to secure in order to receive tenure. However, at the end the consensus was that the grants faculty members pursued are not for personal gain but are educationally based so it is in the interest of the institution, students, etc. Additionally, many faculty who were not tenure track said they pursued grants so they could better understand specific phenomena related to education or student success. Hence, it became intrinsic factor :)

Happy to answer any other questions.

Dr. Betts

Dr. Kristen Betts
Clinical Professor
EdD Program in Educational Leadership & Management
MS Program in Higher Education

Appendix E: Survey Instrument

CLINICAL LABORATORY SCIENCES EDUCATOR SURVEY ADAPTED FROM BETTS (2014) ARMSTRONG FACULTY
2012 SELF-STUDY

Definitions

- For the purposes of this study, the term Distance Education refers to online and hybrid courses/programs.
- Distance Education is defined as using one or multiple technologies such as the internet, one-way or two-way transmissions via open broadcasts, closed circuit, cable, microwave, broadband lines, fiber optics, satellite or wireless communication devices, and/or audio conferencing to provide substantive, synchronous or asynchronous interaction between instructors and students separated in space (adapted from the Higher Learning Commission, 2017).
- Online courses are those where 80-100% of content is delivered online (adapted from Allen & Seaman, 2015)
- Hybrid courses are those where 30-79% of content is delivered online (adapted from Allen & Seaman, 2015)
- Web facilitated courses are those where 1-29% of content is delivered online, essentially a face to face course that uses a learning management system for posting syllabi, assignments (adapted from Allen & Seaman, 2015).
- Traditional courses are those where 0% of content is delivered online (adapted from Allen & Seaman, 2015).
- Distance education training refers to workshops, Boot Camps, and/or seminars that focus on instructional delivery for distance education courses using the internet or a myriad of technologies.

I. DEMOGRAPHICS

1. In which state is your program located? (dropdown box)

2. Which of the following best describes you?
    a. Educator at a medical laboratory scientist (MLS) university/college-based program.
    b. Educator at a medical laboratory technician (MLT) technical and/or college-based program.
    c. Educator at a hospital based MLS or MLT program.
    d. Other (Please specify): _____

3. How long have you been teaching? (dropdown 1-35+ years)

4. Have you previously taught distance education classes i.e. any class with an online component not limited to just MLS or MLT courses as defined below?
    a. Yes, I have taught online classes where 80-100% of content is delivered online.
    b. Yes, I have taught hybrid classes where 30-79% of content is delivered online.

c. No, I teach web facilitated courses where only 1-29% of content is delivered online.
d. No, I teach traditional courses and/or practical skills where 0% of content is delivered online.

5. Approximately what percentage of your current academic load is dedicated to teaching?
   a. 0-25%
   b. 26-50%
   c. 51-75%
   d. 76-100%

II. Distance Education Motivating Factors

This section of the survey focuses on identifying factors motivating faculty's use of distance education in general (i.e. any distance education experience not necessarily MLS or MLT course/program specific).

Rate the extent to which you agree the factors listed below **HAVE MOTIVATED** (for those with distance education teaching experience) or **WOULD MOTIVATE** (for those without prior distance education teaching experience) you in (developing and/or teaching courses) using distance education in general.

Statements	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**NA**
1. Personal motivation to use technology					
2. Opportunity for scholarly pursuit					
3. Release time (e.g., reduced teaching load)					
4. Requirement by department					
5. Support and encouragement from dean					
6. Job security					
7. Financial compensation for participation (e.g., stipend, overload)					
8. Support and encouragement from program director/chair					
9. Institutional pressure/expectation					
10. Opportunity for grants for research					
11. Support and encouragement from departmental colleagues					
12. Intellectual challenge					
13. Overall job satisfaction					
14. Part of teaching load (assigned courses to teach)					
15. Technical support provided by the institution					

16. Career exploration					
17. Credit toward promotion and/or tenure					
18. Distance education training provided by the institution					
19. Greater course flexibility for students					
20. Great course flexibility for faculty					
21. Opportunity to diversify program offerings					
22. Recognition and awards					
23. Ability to reach students who cannot come to campus					
24. Opportunity to diversify my teaching					
25. Access to adequate equipment (e.g., computer, software, etc.) to support distance education teaching					
26. Support and encouragement from institution's administrators					
27. Opportunity to increase access to students with disabilities					
28. Technology incentives for faculty who are involved in distance education (e.g., Laptop, iPad other hardware, software, etc.)					
29. Opportunity to enhance/expand my teaching experience					

III. Distance Education Inhibiting Factors

This section of the survey focuses on identifying factors inhibiting faculty's use of distance education in general (i.e. any distance education experience not necessarily MLS or MLT course/program specific.)

Rate the extent to which you agree the factors listed below **HAVE INHIBITED** (for those with distance education teaching experience) or **WOULD INHIBIT** (for those without prior distance education teaching experience) you from (developing and/or teaching courses) using distance education in general.

Statements	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**NA**
1. Concern about faculty workload					
2. Negative comments made by colleagues about distance education teaching experiences					

3. Lack of distance education training provided by the institution					
4. Lack of support and encouragement from departmental colleagues					
5. Lack of release time (e.g., no reduced teaching load)					
6. Lack of professional prestige					
7. Lack of a technological background					
8. Lack of support and encouragement from dean					
9. Lack of support and encouragement from program director/chair					
10. Lack of financial compensation for participation (e.g., stipend, overload, merit pay)					
11. Concern about quality of courses					
12. Lack of technical support provided by the institution					
13. Lack of adequate equipment (e.g., computer, software, etc.) to support distance education teaching					
14. Lack of support and encouragement from institution's administrators					
15. Institutional pressure/expectation					
16. Concern about quality of students					
17. Lack of recognition and awards					
18. Concern about negative press surrounding distance education					
19. Lack of credit toward tenure and promotion					
20. Lack of technology incentives for faculty who are involved in distance education (e.g., laptop, iPad, other hardware, software, etc.)					

Thank you for completing this survey!

Appendix F: Initial Friendly Email

Dear Clinical Laboratory Science Program Director/Educator,

My name is Reed Brooks and I am a doctoral student at the University of Wisconsin-Stout. As part of my degree requirements I have the opportunity to conduct research aimed at addressing factors influencing Clinical Laboratory Science (CLS) program directors' use of distance education either within clinical laboratory science courses/programs, or within the courses you may teach in general. I hope to obtain information from CLS educators with and without previous distance education experience.

As part of my dissertation I am asking you to complete a short survey to help document factors that help motivate or inhibit your usage of distance education. My goal is to organize this information initially as part of my doctoral dissertation, and later to disseminate the data as future publications. Your responses will provide data that may assist Clinical Laboratory Science programs in assessing distance education within their programs.

The survey should take approximately 10-15 minutes to complete. Responses only require the click of a mouse. No typing is required. **Please look for an email with the live survey link, which will arrive to your email on January 23, 2018.**

Below is additional information regarding this study. This information will also be included in the email with the live survey link you will receive on January 23, 2018.

Risks and Benefits:
Risks to taking this survey are minimal and do not exceed those encountered in everyday life. It is my hope the information obtained from this research will help CLS educators and administrators make decisions regarding distance education in the CLSs.

Time Commitment and Payment:
The survey should take no more than 10-15 minutes to complete and only require the click of a mouse. There will be no monetary compensation for your participation.

Confidentiality:
The survey utilized in this research utilizes an anonymous link option. Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

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 survey 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 investigator. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

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: *Reed Brooks*
CTE EdD Student

Advisor: *Diane Klemme*

IRB Administrator
Elizabeth Buchanan
Office of Research and Sponsored Programs
152 Vocational Rehabilitation Bldg.
UW-Stout
Menomonie, WI 54751

Appendix G: Second Email with Live Survey Link

Dear Clinical Laboratory Science Program Director/Educator,

My name is Reed Brooks and I am a doctoral student at the University of Wisconsin-Stout. As part of my degree requirements I have the opportunity to conduct research aimed at addressing factors influencing Clinical Laboratory Science (CLS) program directors' use of distance education either within clinical laboratory science courses/programs, or within the courses you may teach in general. I hope to obtain information from CLS educators with and without previous distance education experience.

As part of my dissertation I am asking you to complete a short survey to help document factors that help motivate or inhibit your usage of distance education. My goal is to organize this information initially as part of my doctoral dissertation and later to disseminate the data as a future publication. Your responses will provide data that may assist Clinical Laboratory Science programs in assessing distance education in their programs.

The survey should take approximately 10-15 minutes to complete. Responses only require the click of a mouse. No typing is required. I ask that you please complete the survey by February 23, 2018 using the link below.

Insert Link here.

Below is additional information regarding this study.

Risks and Benefits:
Risks to taking this survey are minimal and do not exceed those encountered in everyday life. It is my hope the information obtained from this research will help CLS educators and administrators make decisions regarding distance education in the CLSs.

Time Commitment and Payment:
The survey should take no more than 10-15 minutes to complete and only require the click of a mouse. There will be no monetary compensation for your participation.

Confidentiality:
The survey utilized in this research utilizes an anonymous link option. Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

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 survey 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 investigator. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

Link to withdraw here.

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: *Reed Brooks*
CTE EdD Student

Advisor: *Diane Klemme*

IRB Administrator
Elizabeth Buchanan
Office of Research and Sponsored Programs
152 Vocational Rehabilitation Bldg.
UW-Stout
Menomonie, WI 54751

Appendix H: First Survey Reminder Email

Dear Clinical Laboratory Science Program Director/Educator,

About a week ago I asked you to complete a survey aimed at looking at factors influencing Clinical Laboratory Science (CLS) program directors' (MLS and/or MLT in academic or hospital based programs) use of distance education either within clinical laboratory science courses/programs, or within courses taught in general. If you have already completed the survey thank you for your response. If you have not yet completed the survey I would appreciate it if you could provide your valuable input by completing the survey via the link below.

The survey should take approximately 10-15 minutes to complete and is anonymous. Responses only require the click of a mouse. No typing is required. I ask that you please complete the survey by February 23, 2018 using the following link:

Insert Link here.

Below is additional information regarding this study.

Risks and Benefits:
Risks to taking this survey are minimal and do not exceed those encountered in everyday life. It is my hope the information obtained from this research will help CLS educators and administrators make decisions regarding distance education in the CLSs.

Time Commitment and Payment:
The survey should take no more than 10-15 minutes to complete and only require the click of a mouse. There will be no monetary compensation for your participation.

Confidentiality:
The survey utilized in this research utilizes an anonymous link option. Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

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 survey 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 investigator. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

Link to withdraw here.

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: *Reed Brooks*
CTE EdD Student

Advisor: *Diane Klemme*

IRB Administrator
Elizabeth Buchanan
Office of Research and Sponsored Programs
152 Vocational Rehabilitation Bldg.
UW-Stout
Menomonie, WI 54751

Appendix I: Final Survey Email Reminder

Dear Clinical Laboratory Science Program Director/Educator,

This is my final request to ask you to complete my survey addressing factors motivating and inhibiting CLS program directors'/educators (MLS and/or MLT in academic or hospital based programs) usage of distance education. I hope to obtain information from CLS educators with and without previous distance education experience. If you have already completed the survey, thank you. If you have not yet completed the survey please do, so that your valuable input can be recorded.

The survey should take approximately 10-15 minutes to complete and is anonymous. Responses only require the click of a mouse, no typing is required. I ask that you please complete the survey by February 23, 2018 using the link below.

Insert Link here.

Below is additional information regarding this study.

Risks and Benefits:
Risks to taking this survey are minimal and do not exceed those encountered in everyday life. It is my hope the information obtained from this research will help CLS educators and administrators make decisions regarding distance education in the CLSs.

Time Commitment and Payment:
The survey should take no more than 10-15 minutes to complete and only require the click of a mouse. There will be no monetary compensation for your participation.

Confidentiality:
The survey utilized in this research utilizes an anonymous link option. Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

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 survey 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 investigator. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

Link to withdraw here.

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.

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