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Recruitment and Retention in Medical Laboratory Sciences:

Issues, Strategies, and the Future

by Destini S. Davison

A thesis

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of the requirements for the degree of

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Dedication

This project is dedicated to Susan Collins; my idol, my mentor, my friend. I started this adventure with you when I was a child, and I will never be able to express my gratitude to you for opening my eyes to the amazing world I now live in.

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List of Abbreviations

ASCLS - American Society for Clinical Laboratory Sciences

ASCP - American Society of Clinical Pathologists

CSF - Cerebrospinal Fluid

ISU - Idaho State University

MLS - Medical Laboratory Sciences

MLT - Medical Laboratory Technician

MT - Medical Technologist (synonymous with MLS)

RN - Registered Nurse

Recruitment and Retention in Medical Laboratory Sciences: Issues, Strategies, and the Future

Thesis Abstract - Idaho State University (2018)

The average age of a Medical Laboratory Scientist is 53-57 years of age. Consequently, the age of retirement is rapidly approaching for a large portion of the medical laboratory workforce across the United States. This projected workforce retirement rate, combined with increased demand for medical laboratory professionals, makes the recruitment of future Medical Laboratory Science students critical. The purpose of this study is to determine the most effective methods of recruitment into the Medical Laboratory Science program at Idaho State University. Secondly, it is the hope that this research will aid in ascertaining the best ways in which to retain these students as well as professionals already working in the field.

Survey data was gathered from previous applicants (n=69), current students in Idaho State Universities Medical Laboratory Science program (n=22), as well as current professionals working in the field was gathered (n=46). Data from current students and professional staff was gathered at the American Society for Clinical Laboratory Scientists (Idaho chapter) convention in April of 2017. The data collected from previous student applicants came from those who applied to Idaho State University between the years of 2011-2016. The data demonstrated many different aspects of the Medical Laboratory Science career field and it depicted many trends. The most important of these trends include: age, advertising, recruitment, retention, and marketing. The data also indicated the most effective strategies for recruitment into Idaho State Universities Medical Laboratory Sciences program.

Keywords: Medical Laboratory Science, workforce shortage, recruitment, retention.

Introduction

The need for recruitment research in Medical Laboratory Science (MLS) has never been more critical. There is an aging demographic seen within the MLS workforce, and it is an issue that needs to be addressed immediately. Clinical laboratory personnel and people in the allied health professions make up to 60% of the healthcare workforce (1). Within that workforce the job outlook for Medical Laboratory Scientists is projected to increase at a rate of 16% between the years 2014 and 2024 (2). This is an enormous increase when compared to other career fields that only anticipate an increase of roughly 7% over the same ten-year time frame (2). Census projections show that between 2012 and 2020 the population of people in the United States over 65 years old is expected to double going from 43.1 million to roughly 92 million people (2). This means that by next year (2019), 40% of the work force from the previous ten years will be eligible for retirement. It also suggests the need for more medical professionals to care for the growing numbers of aging citizens across the United States. Data from vacancy rates from different laboratories during the years 2012 to 2014 show that all areas of the laboratory are already suffering from employment shortages except for two: cytogenetics and cytology (2 and 4). Retirement rates have only exacerbated this issue showing impacts on every area of the laboratory, cytogenetics and cytology included (2, 4). As laboratories across the country are currently suffering from shortage issues, as well as the aging population and upcoming retirement of currently working laboratory professionals, adding in this information indicates that laboratory personnel shortages will continue to grow. Additionally, current data shows the younger age generation of clinical laboratory employees are focused on autonomy and less bureaucracy, more than the generations before them, this adds another facet of complexity to the

data (24) To exacerbate the aforementioned issues, there has also been a decline in educational opportunities for prospective MLS students. Between the years 1975 and 2005 the number of Medical Laboratory Science programs in the United States decreased by 67% (5). Medical Laboratory Science programs are very expensive and complex to fund and, therefore, keep functioning. Another factor that can influence educational opportunities and career choices is notoriety. Laboratories seem to be more of an obscure branch of the healthcare field, therefore MLS employees are often overlooked or mistaken for other allied healthcare professionals. Many people in the healthcare industry do not know who laboratorians are or what they do, even though clinical laboratories provide information that can make up as much as 90% of a patient's chart (6).

Recruiting to a notoriously unfamiliar profession can prove difficult. How do we recruit students into the MLS field when there are similar jobs, with higher pay available to them? Statistics from the Department of Labor Bureau of Labor Statistics show that Medical Laboratory Scientists make a national average of \$24.30 per hour, roughly \$50,000 yearly. In Idaho the wage is slightly higher ranging between \$59,000 to \$67,000 yearly, while California leads the nation in the field with Medical Technologists making \$38.70 per hour (about \$80,000 yearly). California also has the second largest workforce of Medical Laboratory Scientists in the nation employing almost 12,000 Medical Laboratory Scientists per 100,000 residents. This is in contrast to Idaho which has one of the lowest concentrations at 60 per 100,000 residents.

All of the above factors are the major contributors to the workforce shortage that is currently affecting the Medical Laboratory Sciences career field. The aging population of laboratory

workers, the decrease in educational opportunities for MLS students, lack of notoriety, and lower wage are only a few of the different issues facing the field. This research survey posed respondents with questions to investigate ways in which to address the above issues and picked out trends to help address the ever-growing issue of the present and future lack of sufficient personnel.

Literature Review

Retirement crisis

Data gathered by the Bureau of Labor Statistics show that Idaho has one of the lowest numbers of laboratorians per resident in the entire nation, employing roughly 60 Medical Laboratory Scientists per every 100,000 residents. In contrast, California has several hundred laboratorians per 100,000 residents (1). Not only is there a shortage of laboratory technologists (MLS), there is also a shortage of laboratory technicians (MLT), but to an even larger extent. Twelve hundred new technicians and technologists are needed annually to combat the current MLS workforce shortage, but only an average of 5,000 MLS graduates enter the field per year (7). This is a detrimental issue that is already affecting the MLS career field. Recently there has been an increase in research being conducted on this subject, which is indicative of its pressing nature, as well as the need for more thorough investigations to be conducted.

For clarification, the key difference between technologists and technicians is the amount of education that each one receives. Technologists (MLS) receive a Bachelor of Science degree, whereas technicians (MLT) typically receive an Associate degree (8). Other variations in titles are seen as well, a Medical Laboratory Scientist may also be referred to as a Clinical Laboratory Scientist, Medical Laboratory Technologist or Medical Technologist. Medical Laboratory Scientists are healthcare professionals who performs chemical, hematological, immunologic, histopathological, cytopathological, microscopic, and bacteriological diagnostic analyses on body fluids such as blood, urine, sputum, CSF, peritoneal fluid, pericardial fluid, and synovial fluid (8). A Medical Laboratory Technician is a person who, while under the supervision of a Medical Technologist (MLS) or physician, may perform lower complexity testing, including, but

not limited to: microscopy and bacteriological tests of human blood, tissue, and other bodily fluids (8). A group of people such as this is also known as Clinical Laboratory Technicians, or Medical Laboratory Technicians (see list of abbreviations).

The bulk of the workforce shortage problem is comprised of a number of different issues. The issues include: age/retirement, projected rate of increase in the field, small number of schools providing accredited education, flat wages, lack of an upward career ladder, and declining interest on behalf of the student (11,13). The above list is not all inclusive, as there are a plethora of influencing and ever-changing factors to be considered. It is certain though that these issues have sown a moderate amount of discord amongst college students whom are poised to enter the workforce, as well as with older medical technologists (MLS) moving forward in their careers, or looking towards retirement (3).

To address these issues in the order listed above, first is the dilemma of age/retirement.

As of 2017 the average age of a Medical Technologist was 53.3 (MLS) years of age, this is one year older than the age for surveys that were conducted in 2016 (2). This is a daunting fact when you consider the large number of technologists (MLS) that will be needed, and are currently needed, in the ever-growing MLS field in combination with the large number of technologists (MLS) poised to efflux from the profession. Census projections show that the population of people 65 years and older is expected to more than double between the years of 2012 and 2019 from 43.1 to 92.0 million people of retirement age (2). The statistics also indicate that by next year (2019) 40% of the workforce from the previous 10 years will be eligible to retire (2). Due to the United States economic crash, which began in 2007, it has been proposed that the age of retirement for Medical Laboratory Scientists may have been pushed back by a couple of years in

order to appropriately compensate but there is no statistical data on that hypothesis. If this is hypothesis could be proven it would be promising news for the Medical Laboratory Science field as it may buy time for schools, directors, and hospitals to create a plan to prevent this detrimental shortage.

MLS Recruitment Challenges

Referring to data published by the Bureau of Labor Statistics the field of Medical Laboratory Science is projected to increase dramatically at a rate of 16% per year (2). When compared to other career fields this is extraordinarily fast, most other career fields only experience an increase at a rate of roughly 7% per year (2). As stated previously, Medical Laboratory Technicians (MLT) are predicted to have a shortage within their field as well, with their projected rate of increase at 18% per year (1). Without properly trained laboratorians, as well as properly staffed laboratories, physicians will miss out on timely and vital information that could be instrumental in the care of patients and will aid in helping to properly diagnose their patients.

Almost half (43%) of clinical laboratories have reported a struggle in hiring medical technologists (MLS) and technicians (MLT). Vacancy surveys for the United States have shown that blood banking (11.6%), histology (9.81%), and chemistry (8.62%) are suffering the most as they hold the highest shortage rates (3). Different facilities have indicated that because of funding issues, some positions are being intentionally left open or eliminated entirely. This makes the task of creating new positions almost impossible to accomplish (8). The impact that this can, and will have, on underserved communities could be exponential. It is a pervasive issue is one that is not going away.

In addition to retirement, issues with the availability of accredited MLS education programs have arisen. Between 1975 and 2005 the number of available MLS programs decreased by 67%, including 477 different university based and hospital-based programs closing their doors (5). Although most of the closures were smaller hospital-based programs, these closures did have a dramatic impact on the career field. What led to this mass decline was primarily the cost of running a Medical Laboratory Science program. Take, for example, Idaho State University (ISU). ISU has 3 fully functioning campuses across the state that offers an accredited Medical Laboratory Science program. Currently it is the only university in the state to offer a Bachelors and Masters level MLS program.

Current shortages have also made mandatory overtime a common occurrence within clinical laboratories across the nation. With the annual wage for a Medical Laboratory Technologist (MLS) being what it is, these practices may deter people from entering the profession (1).

Consequently, we must determine the most effective ways to recruit and retain people in this field when the wages have remained consistently flat, and working conditions may not be ideal. Other careers with similar educational requirements have shown a fairly large discrepancy with regards to wages. An aspiring RN can earn a Bachelors of Science in Nursing in four years, and then enter the field where the average wage is \$33.23 per hour (\$69,110 per year). Clinic Managers with a Bachelor in Medical Services Administration, Healthcare Administration, or another related field make an average salary of \$66,402 (as of August 29, 2016). In addition to wages evaluations, several other ideas that have been discussed in order to increase recruitment, these include: grants and scholarships, loan forgiveness, sign on and moving bonuses, and better visibility at major and minors' fairs.

Another pressing issue in the MLS profession is that of a relatively flat hierarchy (6,10,13).

Other than becoming a supervisor or lab manager, there are really not many other career ladder options for Medical Laboratory Technologists (MLS) within the clinical laboratory. People tend to look forward to the “next-step” in both their personal lives, as well as their careers. This has led to people migrating into different areas of healthcare, therefore giving themselves the option to ascend to something new. Development of a better ladder with more room for growth could lead to less efflux of current technologists into different career fields, therefore, helping with retention issues simultaneously.

The next issue that the MLS field faces in regards to recruitment is the decline in interest on behalf of the student. One reason that has been brought to light is that historically the MLS field has been composed predominantly by females (12,13). As a global issue female equality is currently high on both social and political agendas of many people. Women have started to move into other fields including (but not limited to): research science, medicine, exercise science, and physical therapy, etcetera (12,14). Additionally, as stated above, MLS program availability has become sparser as well.

The next facet of the issue is that the lab is less visible than other occupations so students are not hearing about it when it comes time for them to make career choices. Additionally, college advisors are often unaware of the MLS programs or the scope of their practice, resulting in under-advising or misadvising. In a separate study, college seniors in the MLS or biological science fields were asked who inspired their decision in career choice, and the most often cited answer was self-internet searches and high school advisors. College advisors were very infrequently mentioned (5), this is a large area in which more efforts could be made in order to

attract future Medical Laboratory Scientists. Word of mouth is a powerful tool, this data is indicative of the need for its increased use. Other useful tools may be to propose grants and scholarships, or to otherwise incentivize students to join the profession. The field could also turn to congress to have them look at the supply and demand projections for the next ten years for both the clinical lab and the allied professionals, or perhaps argue for federal investments to help address the issue.

Not only does the MLS profession suffer from low visibility on college campuses, the same can be said about hospital settings as well. Laboratory data makes up anywhere from 70%-94% of a patient medical record. Yet, somehow it has become a chief concern amongst college level students that MLS/MLTs are being underutilized and, that there is a lack of respect towards them amongst other hospital employees (5, 6). The ability to rapidly and accurately conduct tests is crucial to patient safety, health, healthcare costs, and well-being. Not only that, but it is almost always instrumental in directing a physician's next move. A large amount of weight is being put onto laboratory results and yet the technicians and technologists who work within these laboratories are somehow being overlooked, and more importantly, underutilized.

Ideas to increase recruitment have been increasingly discussed. Ideas include a wide variety of topics from loan reimbursement, to outreach programs for younger children. Longevity incentives, sign on bonuses, bringing more recognition to the profession and, as stated earlier, wage evaluations have also been suggested, or even bonuses for teachers who recruit students into the program (9,11, 16, 17). Faculty at Daytona Beach Community College tried the approach of giving teachers bonuses for the students that they recruited, the number of students rose 5.6% after the first year (18). Some of these ideas (longevity incentives, and sign on

bonuses) are ideas that would need to be tackled by individual organizations, but in Southeastern Idaho many are poised to take on the challenge. The easiest strategy is to create an affiliation with an already existing accredited school. For this geographical area that would be Idaho State University. Forming an affiliation with ISU would give the institution access to potential employees from graduating class of upcoming technologists (MLS). Other challenges are ones that Medical Technologists must tackle themselves, and this can be done most effectively by staying active in the profession, as well as in the promoting legislation. Without people speaking up, issues that the field is currently suffering from will continue to go unnoticed and thus no changes will ever be made to alleviate them.

Retention of employees that are already a part of an institution is equally as important, if not more important, as recruitment (20,21,22). Some ideas to improve retention rates include wage evaluation, employer-employee relationships, flexible schedules, as well as recognition for the work that is done well. Wage evaluation is also listed in recruitment, but it is applicable in both areas for different reasons. With respect to recruitment, professional wages are evaluated as a whole: what starting wages are, why they are not higher as a national average, and what can be done to better them. Whereas with retention, wage evaluation would be something done annually or biannually per institution. As experience increases the employee would receive raises based on performance, or if cost of living increases in the region, subsequently so will the wages of the applicable employee (23,24).

Although this list is not comprehensive, it covers many of the issues that have been discussed in the Medical Laboratory Science field over the last 30 years. It is not all bad news though; many studies have been done about the attitudes and perceptions of students about the MLS career

field and there has been positive feedback (1, 9, 10, 11, 13). Many students stated that the idea of a setting in which a variety of tasks could be accomplished at a quick pace appealed to them, also the knowledge gained from such a setting (knowledge such as problem solving and understanding of how the human body works) was equally enticing. Also listed as positive aspects amongst students was the amount of hands on work that is involved in being a Medical Laboratory Technologist (MLS), limited patient contact, and being able to aid in patient care indirectly. The topic of recruitment and retention in the Medical Laboratory Sciences career field is one that absolutely needs to be investigated thoroughly, and in the immediate future.

The literature review presented has addressed the current shortage of Medical Laboratory Scientists in Idaho, as well as the national workforce shortage developing in the United States as a whole. As mentioned previously, Idaho employs one of the lowest numbers of laboratorians per resident in the entire nation (1). The shortage of laboratory personnel plaguing this career field is already upon us. It has the potential to be detrimental to patient health, the survival of hospitals and educational institutions, and wide array of other facilities. Due to age/retirement rate, projected rate of increase, small number of schools providing adequate education, flat wages, lack of upward career ladder and declining interest on the part of students this shortage is only going to intensify. Ideas put into actions in order to increase recruitment and retention will be vital to the Medical Laboratory Science profession in the very near future. Possible ideas may include loan reimbursement, outreach programs, wage evaluations, longevity incentives, sign on bonuses, and promoting recognition of the profession (20,21,22,23,24,25). Apart from recruitment, retention needs aid as well and we can do this by employing similar means of wage evaluations, better employer-employee relationships, flexible schedules, as well as recognition

for the work that is done. Without efforts made in both of these areas laboratorians and patients alike will suffer. New ideas about how to better recruit and retain Medical Laboratory Scientists into programs and the career field will be vital in the coming years for the profession. The purpose of this study is to aid the ISU MLS program in determining who their target audience is for recruitment, and how to best spend their limited time and resources in these efforts. The cost of hiring someone unsuitable for a job can cost up to 2 times as much as hiring a suitable one due to wasted training and subsequently re-training employees (20). So an additional purpose of this study is to aid in retention of quality employees.

Methodology

1. Participant/Sampling and Selection

Survey data was gathered from previous students (n=69) and current students in the Medical Laboratory Science program at Idaho State University, as well as professionals in the field. As the survey was anonymous, there is no way to discern with absolutely certainty the number of current students from current professionals and vice versa. The data from previous students was anonymous data gathered from the application process between the years 2011 and 2016, accounting for a 100% response rate. The data was provided through the current program director of the Medical Laboratory Science program, Rachel Hulse. The data from current professionals and current students was collected via survey that was administered at the Idaho chapter of the American Society for Clinical Laboratory Scientists (ASCLS) convention in April of 2017. All attendees were invited to participate and a copy of the survey was in the welcome packets for attendees and could be returned throughout the course of the event. Surveys were also available at a lecture presented at the ASCLS Idaho convention on the same topic.

In order to promote increased participation, two raffle tickets were attached to each survey. The prize for the raffle drawing was a basket which included: an Idaho State University coffee mug, Idaho State University pencils, a cinema gift card, and assorted candies. Sixty-eight attendees returned surveys at the end of the ASCLS convention out of a total of 89 attendees, giving a response rate of 76.4%.

While at the ASCLS Idaho conference a lecture was also presented on recruitment and retention within the laboratory science field. The session lasted 30 minutes and covered all of the above information. It included what the issues are within the Medical Laboratory Science field, how

these issues arose, ideas that could be used to combat them, and what people inside and outside of the laboratory field can do to help with the recruitment and retention issues. The lecture that was presented also counted for two continuing education credits for the people in attendance. At the conclusion of the lecture completed surveys were gathered from the convention as a whole, including those from people who elected to attend a lecture other than mine.

2. Instrumentation

The survey was designed using “*How to ask Survey Questions*” 2nd Edition by Arlene Fink (19) (Appendix A). The assistance of ISU MLS program faculty: Rachel Hulse, Sue Galindo, and Debbie Shell was also utilized during the editing portion of the survey, and while tailoring the questions to get the greatest amount of useful information..

3. Design/Analysis

The survey consisted of a total of 38 related questions. Twenty-eight of the questions were multiple choice and the remaining ten were short answer questions. At the end of the survey there was a section for participants to leave their contact information if they desired, this was done so that participants could be contacted if further information was needed. The questions within the survey were closely related to each other, or otherwise worded, to get more reliable data points. The questions covered everything from basic demographic questions, questions about education level, and current employment status. The opinion-based questions were inserted in order to gauge the participants thoughts and ideas on recruitment and retention as a comprehensive issue, such as: what strategies of recruitment do they find most effective (flyers, games, instructor involvement), and what forms of advertisements entice them the most (Appendix A)?

Results

The first section of the survey gathered the demographic data of the participants. This sample population data demonstrates this group had a significantly lower age than the national average of MLS professionals previously reported, averaging 37.9 years of age, like due to high number of student participants. In addition, over half of the participants reported being an active MLS professional for 0-5 years (61.7%). Of the remaining participants, 10.3% had been an active MLS professional for 5-10 years, 7.4% for 10-15 years, 5.9% for 15-20 years, and 14.7% reported being an active MLS professional for greater than 20 years.

Consistent with previous reported demographic data of the MLS profession, 78% of the survey participants in this study were female. Additional demographics gathered were in reference to which racial or ethnic group(s) the participants most identified with. 85% of the sample population identified as white, 4% identified as Hispanic, another 4% as Asian, 3% identified as Middle Eastern, 1% as Native Hawaiian or other pacific islander, and another 1% as Black or African American (Table 1).

Table 1: To which racial or ethnic group(s) do you most identify?

PARTICIPANT ANSWERS	RESPONSES
White	58
Hispanic	3
Asian	3
Middle Eastern	2
Native Hawaiian or other Pacific Islander	1
Black or African American	1

Of the 61 participants that answered the question about whether participants agreed or disagreed with the statement that underrepresented racial and ethnic groups in Idaho represented a potentially large population for recruitment, 30 of them were neutral on this topic, 10 agreed strongly, 14 agreed somewhat, and 7 disagreed somewhat. Of the survey respondents, no one disagreed strongly.

The next section of survey questions were designed to assess the participant's personal recruitment path into the MLS profession, for example, how did they hear about the field, when did they decide MLS was their career choice, and what kind of factors influenced their choice to join the career field? From the 59 survey respondents, approximately 1/3 (n=20) of them had first learned about the MLS career field from a family member. Twenty percent (n=12) learned of the field from an employer, and another 24% (n=14) from a college counselor or professor. Four (6.8%) respondents had discovered the field from a program brochure, and only one respondent (1.7%), had learned about the field from a career fair (Figure 1).

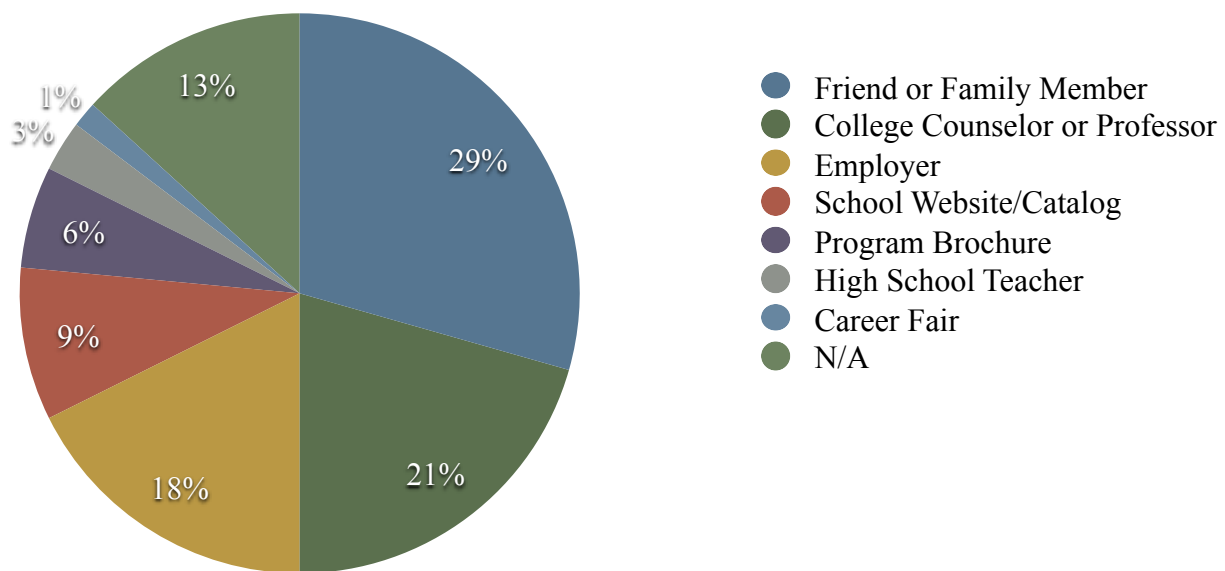


Figure 1: Professional Career Awareness. This pie chart demonstrates how survey respondents (n=68) initially learned about the Medical Laboratory Science profession. The key indicates responses in the order of decreasing frequency.

The follow-up questions to the recruitment questions included “At what time did you decide to pursue the MLS profession?” The question was designed to gage how the sample pool had decided to embark on this path, with an end goal of determining what methods of recruitment were/are most effective per demographic. Forty-one percent (n=24) of respondents decided on this career path while in their Post Baccalaureate years, 25% while in there junior/senior year of college, 17% in their freshman/sophomore year of college, and another 17% decided on this path while still in junior high or high school.

Next, the survey investigated who most influenced the respondent’s decision-making process.

For this question, a surprising, 33 respondents declined to answer. Of the participants that had

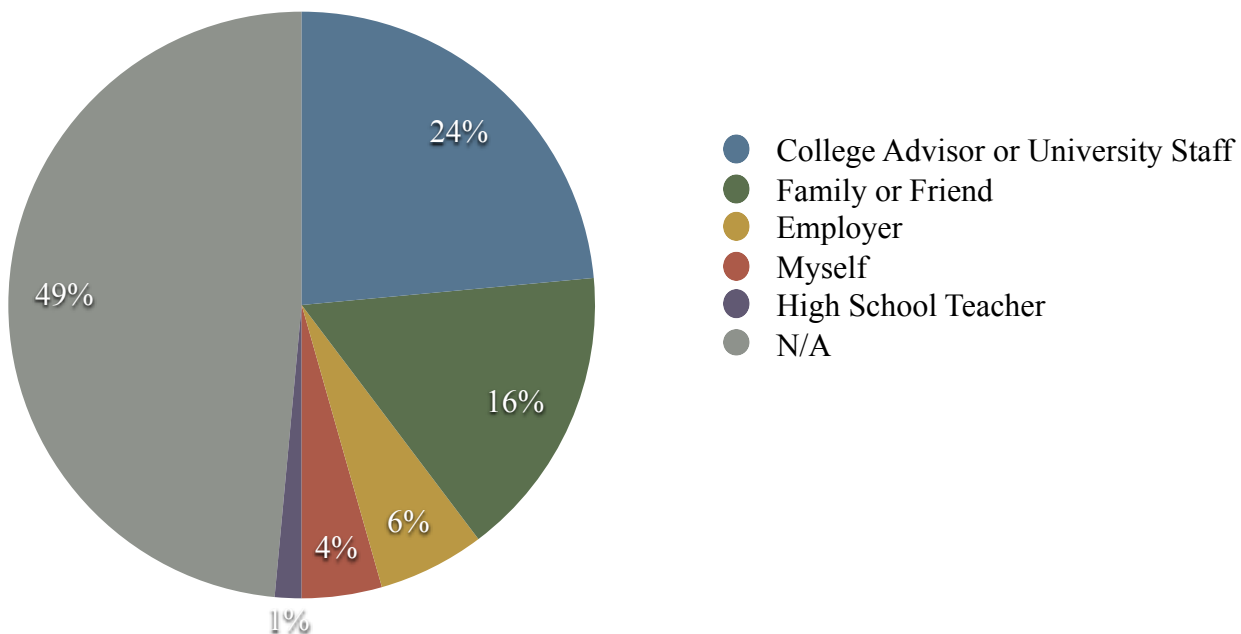


Figure 2: Professional Career Influences. This pie chart depicts what most most influenced survey respondents (n=68) in choosing to pursue a Medical Laboratory Science program. The key indicates responses in order of decreasing frequency.

already received degrees in Medical Laboratory Science (47 of the 68), 72% (n=34) of them received their degree through the ISU MLS program. Of the remaining 35 respondents 31% (n=11), said that friends and/or family most influenced their choice and 45.5% (n=16) stated that a college advisor or university staff member influenced their decision (Figure 2).

Other participants earned their degrees through University of Utah (n=5), UC Davis, and a variety of online programs (n=8). When asked what level of education the respondents had earned 53% (n=36) received a Bachelor's degree (n=36), 13% received a Master's degree (n=9), 8.8% completed some post-graduate work (n=6), and 2% received an Associate's degree (n=1).

The next section of the survey asked questions regarding what factors MLS professionals found most and least appealing in their chosen career field, and how important different aspects of the clinical laboratory were to them. Results for the most appealing aspect of the clinical laboratory were fairly flat. Fourteen participants answered N/A (20.6%) and 8 of those correlated to participants who had not yet received an MLS degree, it is therefore, safe to assume that these participants were students. Of the remaining respondents, 22.1% (n=15) believe that the ever-present national demand is the most appealing aspect of the field, 19.1% (n=13) cited the changing environment, and 11.8% (n=8) thought shift flexibility was most valuable. Of the remaining portion, 7.4% (n=5) answered helping patients indirectly, the fast-paced setting of the laboratory and the science (22.2% total) was the most appealing aspect of the MLS career. The remaining 4.2% (n=4) of respondents gave a variety of answers including personal joy (n=2), and the professional challenge (n=2) (Figure 3).

Questioning what respondents viewed to be the least appealing aspect of the MLS field revealed a more diverse set of responses. Twelve respondents (17.6%) answered N/A and again, eight

correlated to suspected students. Of the remaining cohort, 56 (42.9%) of respondents cited high stress levels at work as the least appealing aspect of working in the laboratory. Followed by 11 participants (19.6%) who cited issues with wage. The next cluster of answers included limited patient contact (14.3%) and limited upward growth (12.5%). The remaining 10.7% (n=6) had a wide variety of answers including: computer systems, the ASCP exam, staffing issues, lack of acknowledgement from areas outside the laboratory, lack of schedule flexibility, and exposure to body fluids (Figure 3).

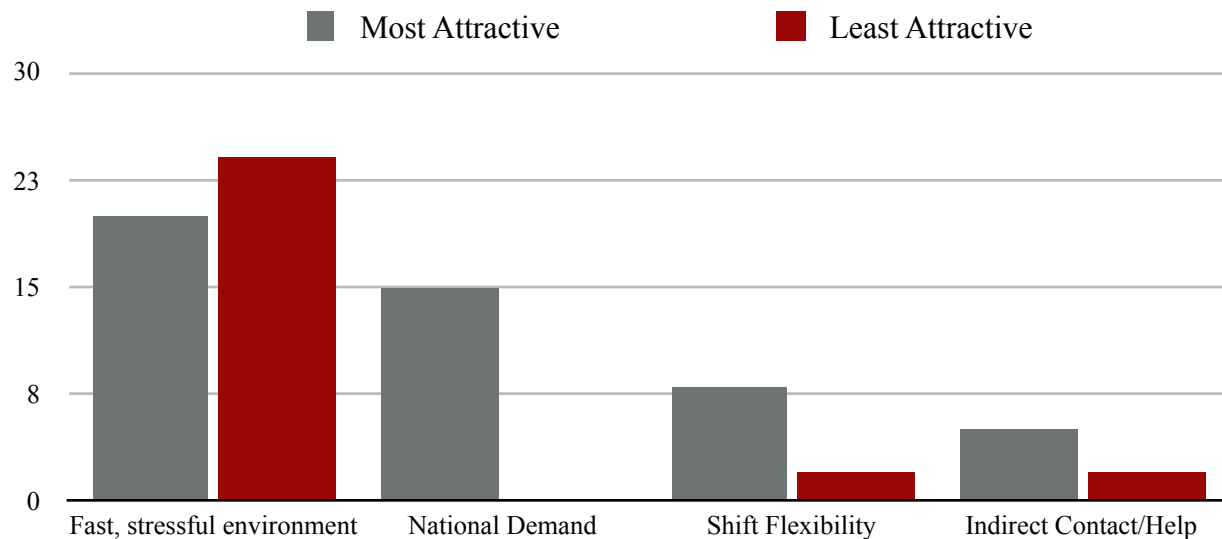


Figure 3: Professional Career Aspects. This bar graph demonstrates the most attractive, and least attractive aspects of the Medical Laboratory Science career field, as answered by the sample population (most attractive n=48, least attractive n=28).

Discovering what participants felt was the best part of working in a laboratory versus what they thought the best marketing strategies for recruitment was how this study gauged whether current efforts were targeting potential future laboratorians. If current laboratorians feel passionately about certain aspects of being a Medical Laboratory Scientist, it follows that these aspects should be the most advertised part of laboratory education. Of the 56 participants that answered, 28 (50%) of them stated that technology was the most marketable aspect of the lab. Other answers

included: fast pace (17.6%), shift options (5.4%), benefits (16.2%), making a difference in patients' lives (5.4%), job security (3.6%), and hands on work (1.8%).

The following survey questions gathered data on where participants received most of their general advertising information: how much time they spent taking in advertising information (watching TV, reading newspapers, etc.), and whether or not participants believe that advertising information influenced different day to day activities. Social media was, the most prevalent answer with 53.4% of respondents citing that that is where they receive most of their advertising information. Next, 20.7% cited newspapers or magazines as their major source of advertising, closely followed by 19% receiving this information from television advertisement. The remaining percentage (roughly 7%) gathered advertising information from the internet, or they were unsure of where, or if they have received any advertising information at all (Figure 4).

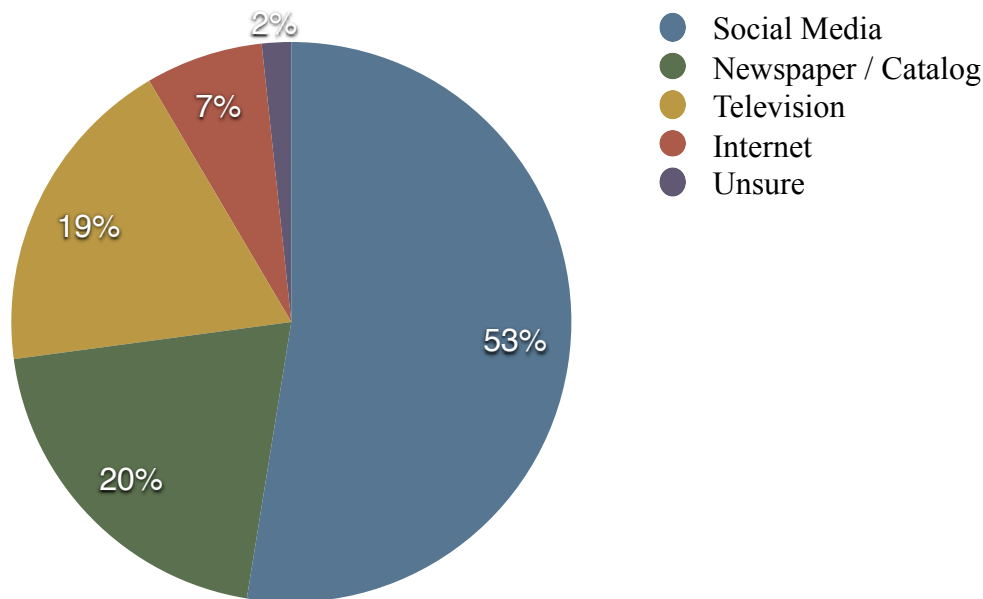


Figure 4: Personal Advertising Intake. This pie chart demonstrates where survey respondents (n=59) indicated they receive the majority of their advertising information. The key indicates responses in the order of decreasing frequency.

This line of questioning continued for several more questions. The next item to address is how much time the respondents spend on absorbing and/or seeing different types of advertising. For this question the possible answers included: less than 30 minutes, 30-45 minutes, 45-60 minutes, or greater than 60 minutes. Sixty-six out of the potential 68 participants responded, and of those 36.4% spent greater than 60 minutes engaging in activities that present opportunities for advertisement. Including activities such as watching TV, reading newspapers or magazines, or using social media platforms. Next, 24.2% (n=16) answered that they spend 45-60 minutes per day, closely followed by 21.2% (n=14) citing less than 30 minutes per day. Finally, 18.1% (n=12) of respondents answered this question with 30-45 minutes spent per day engaging in activities that provide advertising information.

Respondents were then asked what qualities they felt best creates memorable advertising. Unfortunately, 22.1% (n=15) of respondents declined to answer this question. Of the participants that did respond, 39.6% (n=21) agreed that humor in advertising is the best way to have it remembered. Followed by “video or image content” at 24.6% (n=13). A jingle tied with a catch phrase with a total of 30.2% (n=16) of participants citing these as the best ways to create memorable advertising. The remainder of the participants thought either the message itself, or an emotional connection was best.

It is evident that the respondents engage in a fair amount of advertising opportunities, and that they have fairly strong ideas about the most effective types of advertising. As such, the next question was designed to assess the participants belief that advertising information influences their day to day decision making. Including, but not limited to: restaurant or bank choices,

grocery store decisions, or general event attendance. The answers received for this question were not as diverse as previous questions asked. Only one respondent declined to answer, but 34.3% (n=23) somewhat agreed that the above statement was true, that advertising information did influence their routine decision making. Next, 32.8% (n=22) of respondents were neutral on the topic, 9% (n=9) of respondents answered that they strongly disagreed, another 9% (n=9) answered that they somewhat disagreed, and finally, the remaining respondents answered that they strongly agreed with the above statement.

The next section of survey questions transitioned from general advertisement assessment to evaluation of advertising specifically in regards to MLS education recruitment. Surprisingly, 15 of the 68 respondents declined to answer this question. Of those that did respond 47.2% (n=25) believe that career fairs, or major/minor fairs, are the best ways in which to reach out to students. An equal number (13.2%) thought that lab tours and hands on activities (n=7), or videos (n=7), was the most effective way. The remaining 26.4% had a wide variety of answers which included: outreach programs to high schools (n=5), word of mouth (n=1), high school career fairs and/or counseling (n=2), internal promotion of the field so that people know that MLS is an option (n=4), speaking to students and teachers (n=1), and advertisements on Quizlet (n=1) (Figure 5). While nearly 50% (n=25) of the cohort thought that career fairs or major/minors fairs were the most effective. 65% (n=41) of participants had actually participated in such an event, whereas the remainder had not or thought that it was not applicable to them. The follow up question posed to participants assessed whether or not the MLS field had been represented at these recruitment events. 52.9% (n=36) answered that this question was not applicable to them. Of those who did answer, 26.5% (n=18) said that it was represented while the remaining 20.6%

(n=14) said that it was not.

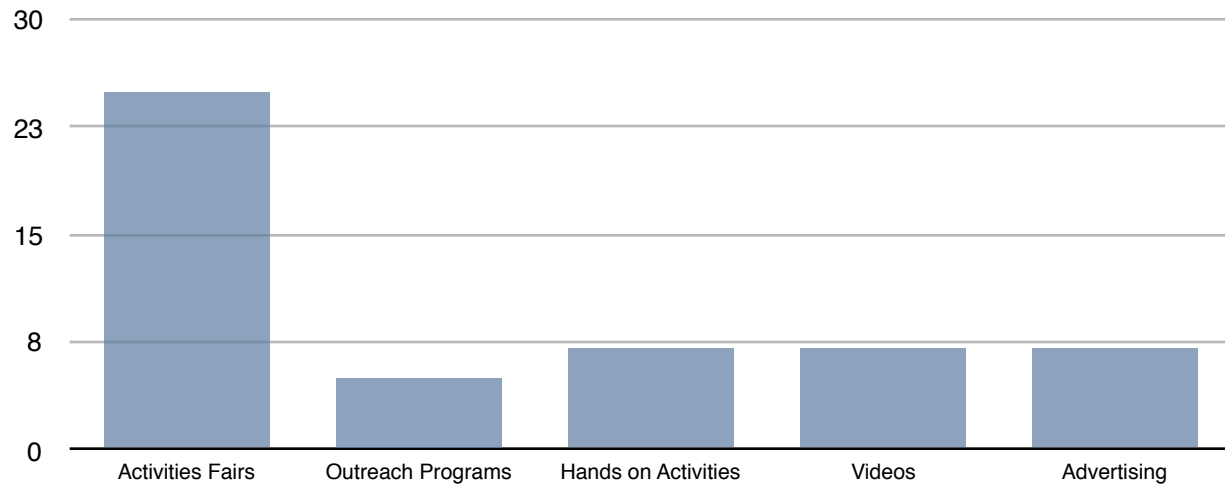


Figure 5: Recruitment Strategies. The bar graph below dictates the sample populations opinion on the best strategies for student recruitment into the Medical Laboratory Sciences program (n=51).

Next, participants were asked their opinion on what the most attractive feature of a career fair booth, major/minor fair booth, or similar. The question was presented to participants so they could select as many answers as they felt were applicable. The top answers were hands on activities (n=22) and/or giveaways (N=19), followed closely by experienced faculty present (n=15), colorful posters (n=11), and students present (n=7). Low frequency answers included: candy (n=1), friendly people (n=3), brochures (n=4), games (n=9), and professionalism (n=1). The subsequent section of questions was geared toward finances. Questions included: what are the most common ways in which an MLS education was funded amongst the group, how much is still owed, and where participants believed funds could be most usefully allocated. Of the cohort, almost half (44.6%) had yet to receive a Medical Laboratory Sciences degree, but of those who had, graduation dates ranged from 1974 to 2017. Of this group, most (n=38) funded their education via government financial aid. Closely behind this was working (n=30), savings accounts (n=20), and scholarships (n=19). Lower on the list of answers was parent and/or family

support (n=12), employer financing (n=3), and personal bank loans (n=7). Of the entire group two received their education through a the GI bill. Of the participants whom have received their degrees, 42.9% (n=27) currently have no student loan debt. Whereas on the opposite end of the spectrum 27% (n=17) owe greater than \$20,000. 4.8% (n=3) percent owe between 0 dollars and 5,000 dollars, 6.3% (n=4) owe between 5,000 dollars and 10,000 dollars, 9.5% (n=6) of participants owe between 10,000 dollars and 15,000 dollars and an additional 9.5% (n=6) owe between 15,000 dollars and 20,000 dollars. Four participants marked this question as not applicable and one participant preferred not to answer (Table 2).

After reflecting on when they graduated, debt they have incurred, and what they thought were good marketing strategies, the cohort had to choose an incentive in which to allocate theoretical funds. In hopes of recruiting more MLS students, what would they choose? Loan forgiveness programs came out in the lead at 41.1% (n=23) followed by scholarships at 32.1%. (n=18) After that, 16.1% (n=9) answered grant programs and the remaining 10.7% (n=6) thought that better marketing strategies were the best incentive investment.

In an attempt to correlate financial debts with age, the next question posed to the group was, “What position do you hold in the MLS field?” The result for this question was more evenly split than anticipated, with 32.3% being Medical Laboratory Scientists and 43.1% being students. The rest of participants were professors or faculty, retired, or Medical Laboratory Technicians. To follow this up, the survey inquired into the employment status of participants (full time, part time, unemployed, as needed) and whether or not they were employed for wages. Fifty percent (n=34) of participants were employed full time, an additional 25% (n= 17) were employed part time, and finally 19.2% (n=13) were not employed at all. For these questions two participants

worked in laboratories as needed and three participants found the question not applicable to themselves. Are these paid employees, students, or retired? Roughly 31% (n=20) of the group that answered question were students and 66% (n=42) received wages. The few remaining participants were either retired or declined to answer (n=6).

The study then attempted to ascertain overall satisfaction levels of employees within laboratories. The question was posed to the current workforce as well as student interns. For those in which the question applied to (all but those not currently working in a lab), 50.8% (n=30) stated that they were very satisfied with their current job. Next was the group that was somewhat satisfied with 32.2% (n=19) of participants marking that option, and the remainder of the cohort marked neutral (n=10). None of the participants marked either slightly dissatisfied, or strongly dissatisfied. Being satisfied with your job doesn't necessarily equate to happiness, so

DESCRIPTION	
None	27
\$0 - \$5,000	3
\$5,000 - \$10,000	4
\$10,000 - \$15,000	6
\$15,000 - \$20,000	6
> \$20,000	17
Declined to answer	1
N/A	4

how much of this cohort felt appreciated at their current job? Of those who answered, 29.9% (n=20) felt appreciated all of the time, 42.1% (n=24) felt appreciates some of the time, 19.3% (n=11) were neutral about the question, and 3.5% (n=2) felt appreciated almost never.

To finish the questionnaire a few questions were asked about the current workforce shortage plaguing the Medical Laboratory Sciences field. First, this open-ended question was posed, “Medical Laboratory Sciences will always have available jobs in the state of Idaho.” Over half (51.6%) of respondents strongly agreed with the above statement, and an additional 33.3% (n=22) somewhat agreed with it. After that, 12.1% (n=8) were neutral and 3% (n=2) disagreed somewhat with the statement. None of the respondents disagreed strongly.

The next question asked if, before my lecture, participants were aware of the critical workforce shortage currently afflicting the MLS career field. Of the 67 respondents, 85.1% (n=57) of them were aware of this issue, while the remainder were not (n=14). Of the group currently working within a laboratory, 68.1% (n= 30) reported that they themselves were currently suffering from

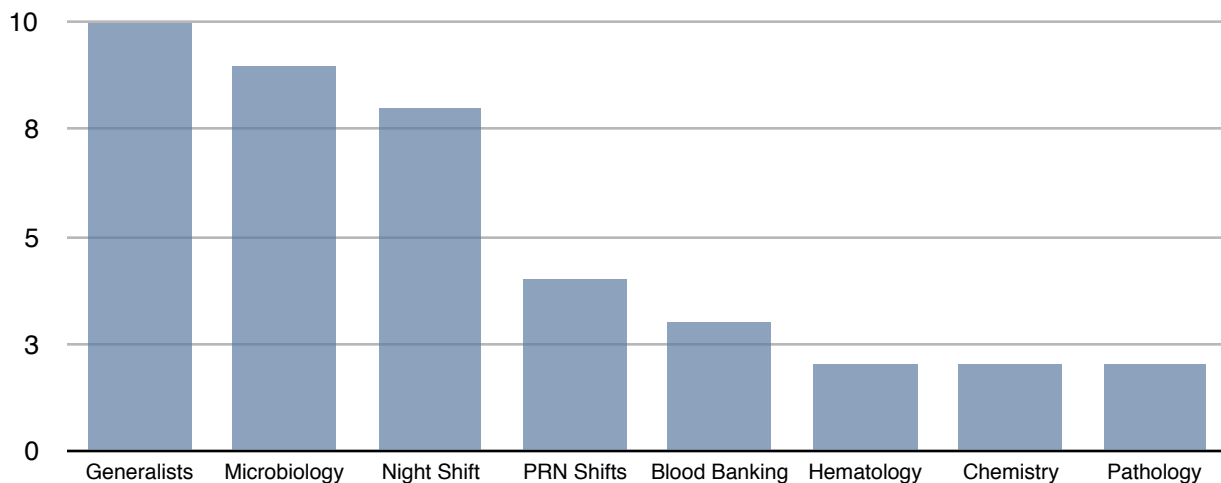


Figure 6: Laboratory Shortages. This bar graph demonstrates the clinical laboratory areas that survey respondents (n=40) felt were suffering most significantly from work staff shortages.

this issue in multiple different areas of the laboratory. Areas reporting shortages included: blood bank, microbiology, hematology, chemistry, pathology transcriptionists, generalists, and phlebotomists. Shortages were also reported in reference to different shifts available in the

laboratory, with shortages seen in all time slots (Full time, part time, evenings, nights, and PRN) (Figure 6).

The second set of data was gathered from student applicants in the years 2012-2019. The data was collected from the student applications submitted for admittance into the MLS program at Idaho State University. The application includes questions about demographics (for years 2018-2019) as well as how the applicants heard of the Medical Laboratory Science program (all of the above years). Age and ethnicity demographics were significantly different, and much more diverse than the data that was collected at the ASCLS Idaho convention. The average age of applicants for the academic school year 2018-2019 was 26.4 years old. Racial demographics showed us that 16.2% of this cohort identified as Asian or Pacific Islander, 7.6% as Black or African American, 6.1% as Latino or Hispanic, 1.5% as Middle Eastern, and an additional 1.5% responded with Native American or American Indian (20,21). The remainder of this group identified as White.

When asked how this group (years 2012-2019) had heard about the MLS program the most cited answer was, by far, self-driven searches. The above insinuates that, of the roughly 250 respondents, 40% (n=111) answered that way. There was a variety of answers that included: family, friends, the ISU catalog, the MLS website, and others. The most common answer after self-searches, at 25.7% (n=56) of respondents answering thus, was that an advisor or MLS professional had enlightened them about the possible career path, followed closely by 18.8% (n=44) citing a friend or family member. Of the remaining results, 7% (n=26) responded with employers helping to direct them, and the remainder answered “other” or not at all.

Discussion

Beginning with the age discrepancy, current data estimates the age of a Medical Technologist to be 53-57 years of age. The data yielded an average age of 37.9 years of age. When broken into subdivisions, the average age of active MLS professional participants (n=34) the average age was 42 years old, while the MLS student participants (n=22) average age was 30 years old.

Therefore indicating the lower age results is perhaps a result of the large student population present at the ASCLS Idaho convention. The data may also be limited but the number and types of participants who attended the conference, as it may not best represent the status of MLS professionals in the state as a whole. Data from a follow up question on the survey yielded similar information showing that 61.7% of respondents have been part of the MLS career field for 0-5 years, whilst only 14.7% have been a part of it for greater than 20 years.

Out of the attendees that completed the survey, 69.1% (n=47) of them had received a degree in Medical Laboratory Sciences. From that cohort 34 of the 47 (72.3%) respondents received that degree from Idaho State University, this information in itself could point to the shortage of available opportunities out there for up and coming Medical Laboratory Scientists, or it could simply be because this data was gathered at the ASCLS Idaho Convention, causing my sample population to be geographically similar.

Whom are we currently recruiting into Idaho State Universities Medical Laboratory Science program? As described previously, the average age of a current ISU MLS program applicant is 26.4 years of age, indicating that these people were born in and around the early 1990's. It can then be inferred that advertising the MLS program through a newspaper and/or catalog outlet would be quite ineffective. The inference is supported by the fact that only 20.7% of the cohort

cited newspapers or magazines as their major source of advertising. The average age of the participants was slightly higher than that of the applicants, but even so, social media was the most prevalent answer (at 53.4%) with regards to where participants received their advertising information. It is also important to note that roughly 75% of participants spend greater than 45 minutes or more a day engaging in activities that present opportunities for receiving advertising information.

Based on this study's responses, what is the most effective recruitment tactic for the MLS program? What components can be associated with this tactic to make it more effective? This part will be synthesized via multiple questions that were asked within the survey. Almost half of the cohort believed that career fairs, or major/minor fairs are the most effective form of recruitment. The data is further supported by the fact that greater than 61% of them had participated in at least one of the above activities. After that roughly 25% thought that lab tours, hands on activities, or videos/image content were most effective. In addition, 40% of participants think that humor is the best way to create memorable advertising.

Based on survey results, it appears that career fairs and/or major/minor fairs are the best strategies for recruitment. The above activities can be elevated by incorporating hands on activities, giveaways and having experienced faculty present, but this can only happen if MLS programs are represented at these different activities. Of the participants that responded there was about a 50/50 split. Half of the cohort said that the MLS field was represented at an event that they attended and the other half said that it was not.

In order to develop the best recruitment strategy, we also need to factor in the most appealing aspects of the field. According to this data, that would mean focusing on the fascinating technology that is used within the laboratory and finding ways to minimize debt (Figure 7).

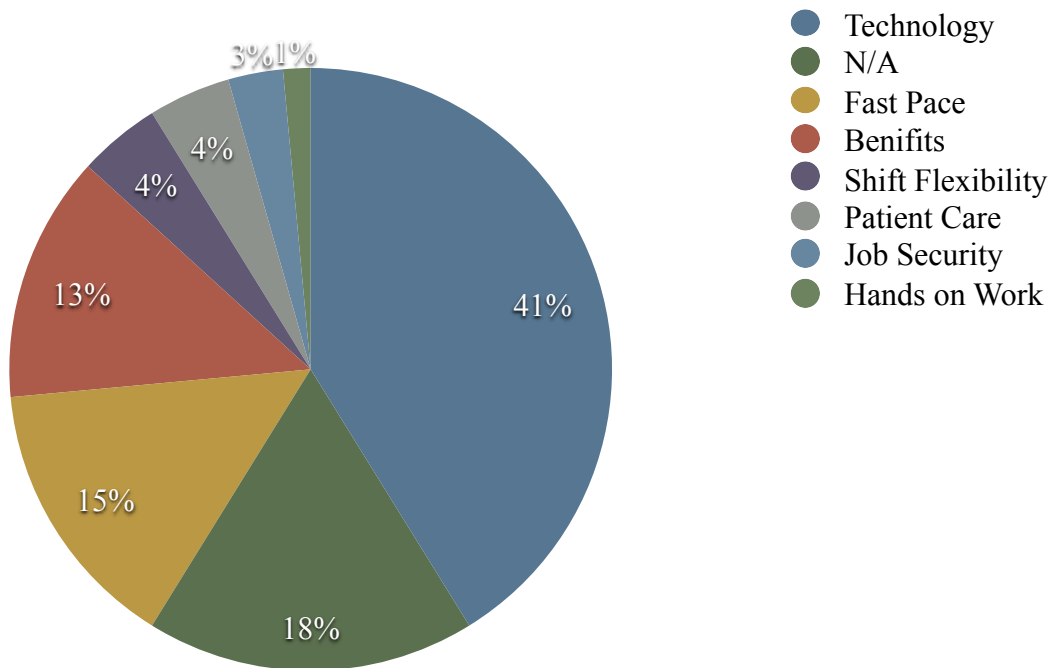


Figure 7: Marketable Laboratory Aspects. This pie chart demonstrates what survey respondents (n=68) believe to be the most marketable aspects of the clinical laboratory. The key indicates responses in the order of decreasing frequency.

Loan forgiveness options were also a highly popular answer with this cohort as they used a variety of avenues to fund their educations. The most highly answered option was government financial aid and/or working and over half of them still owe \$10,000 dollars or more government financial aid debt. The data from this survey showed that job satisfaction is not a concern. Laboratory worker participants appear to be highly satisfied with their jobs, they more often than not have the feeling that they are appreciated, yet another aspect that could be played on to

increase not only recruitment, but retention as well. Based on statistics from the Department of Labor, national demand dictates that there is going to be an increased need for future laboratory science workers, not only in Idaho, but across the entire United States. In essence, this means that people entering the field can have a nearly guaranteed job upon graduating. Not only that, but they can have an exciting and satisfying career as well.

Many positive aspects to working in a laboratory have been cited, but many people do not know that the job even exists. Word of mouth was not cited as a good option for promoting the field, but the opportunity to include it can only be beneficial. An anonymous participant stated:

“Current laboratory technologists are our own worst enemy. We are overworked and frustrated and don’t encourage young people to do this line of work, but we really need to do better promoting ourselves and our profession.”

Overall, the Medical Laboratory Science field needs to be represented at more career fairs and major/minor fairs. Not only does there need to be more representation, there needs to be different representation. Booths need to include hands on activities, such as a simple titration demonstration (phenolphthalein for a pink color, or a bromothymol blue indicator). A titration demonstration is relatively inexpensive, quick, interactive, and fun, it incorporates the cohort’s opinion on booths, bright colors, and experienced students and/or faculty being present as the most effective recruitment tactics all in one shot. On the same token this is an opportunity to use the word of mouth approach as well. Although, as stated before, word of mouth was not deemed an effective approach to recruitment, the above scenario presents an opportunity for its use.

Many of the aspects of increasing recruitment, that the cohort supported, all seemed able to be lumped into one event, career fairs and major/minor fairs (as synthesized above). That above

data does not include when the cohort was asked “If you could choose as incentive in which to allocate funds in hopes of recruiting more Medical Laboratory Science students what would it be?” Almost 90% of the answers that were received were monetary based, not marketing based. The most prevalent answer was loan forgiveness programs, follow by scholarships, and then grant programs.

Loan forgiveness programs are maintained and managed on a state-by-state basis, as well as by the federal government. Idaho has one large state managed loan forgiveness plan, titled Idaho State Loan Repayment Program. This loan repayment program is a multi-disciplinary, state-based loan repayment program for people who work for a nonprofit agency or public entity located in a federally-designated health professions shortage area. Includeing areas where there is a shortage of workers in a geographical area, where there is a shortage of workers in a population group (low income, migrant farmers), and different facilities (correctional facilities, state mental hospitals, etc.) (16).

Federal loan reimbursement looks similar to state reimbursement in regards to the fact that they also include geographical areas, population districts, and specified facilities (16). In addition to those there are also many field specific options. For RN’s there is the Perkins Loan Forgiveness program (16). Teachers are eligible for up to \$18,000 in loan reimbursement if they work for a certain amount of time and/or places. Doctors are able to negotiate their loan repayment rates in a variety of ways. Currently there is not a reimbursement program, state or federal, that is specific to the Medical Laboratory Sciences field.

The best way for the final part of the data to make a difference in real world scenarios would be for it to bring to light the importance of current Medical Laboratory Scientists and future

Medical Laboratory Scientists being active in their career field. Attending the ASCLS Idaho conference every year is one way to get a year's worth of updates. As a part of the organization members will receive updates on important information, changes in legislation, and calls to action when it is extremely important that MLS employees act on a topic. Promoting student participation every year at this convention is a great way to introduce them to all of the benefits that come with being a member, and help them to realize how important it is to stay involve (23). "Current professional leaders must assume new roles too as ambassadors for the profession and become proactive members." (23)

Efforts on this front should not end there, promoting the different student positions available within the different MLS professional organizations (ASCLS, ASCP, etc) will help to make sure that the younger demographics voice is being heard. The issue of age-related changes has already been addressed, as it pertains to the demographic within the laboratory, but it has not been addressed from this perspective. Making sure that the organizations that represent the Medical Laboratory Science field are including a larger student population in their day to day functions will promote more student involvement in the future. Ensuring that a younger age group is involved early on will foster both a more productive group of people, and a more cohesive, and equally represented group that can then tackle issues happening everyday from a governmental/legislative perspective.

I went through the MLS program in the 2014-2015 school year. From my perspective, at that time promotion of the ASCLS organization was limited. The members of the organization and what those members did within it was not something that was thoroughly covered. That being said, I went through the program at a tumultuous time when a lot of changes were occurring. At

the last ASCLS Idaho conference (April 2018) ASCLS had the largest number of student officers than it has ever had, this was highlighted during a presentation, as were their different functions within the organization. The idea was very well received, as students and teachers alike discussed it multiple times throughout the conference. More can be done in order to promote these available positions to students and encourage them to participate before they move into the field.

The annual ASCLS-Idaho chapter meeting is typically in April every year. A course within the MLS program requires students to develop a short presentation about a novel process, assay organism, or other advancement of their choice to be presented at the Scientific Assembly portion of the ASCLS Idaho convention. Meaning that all of the students that pass through the program, including online students, get free admission into the event and can attend lectures of their choosing. This allows students to see what the inter-workings of the event looks like.

Incidentally, all students have almost completed all of their course work and are poised to enter the field. Therefore, they are already ineligible for student office positions. Promoting this earlier on in the school year, or shortly after acceptance into the program is an excellent opportunity to encourage more student to join. As has already been stated, more student and/or newly entered Medical Technologists being involved will help to perpetuate ideas to better the career field as a whole.

Summarily, the best way in which to recruit potential new students into the program is use multiple diverse strategies specifically tailored to peak their interest. First and foremost, career fairs and major/minor fairs, the MLS field needs to be represented at every available event that it can be. Highlighting the most interesting and marketable areas of the laboratory will make the

best execution. Aspects such as: the technology used, the fast-paced environment, and/or the way that Medical Technologists contribute to patient care. Another strategy that needs to be employed, in conjunction with the previous strategy or alone, is the use of hands-on activities (titration, blood typing), bright colors (titration again, posters/signs, videos), giveaways, and also the presence of an exuberant and experienced technologist at any event that is showcasing the Medical Laboratory Sciences field.

The next category of effective recruitment tackles the issue of retention as well. Promoting financial incentives and benefits that come with being Medical Technologists will drive the younger generation to the career field for many reasons. A major one being that the amount of student loan debt incurred per student is the highest that it has ever been. The only real way to make changes from a financial aspect is to make sure that the voice of the Medical Laboratory Scientist is being heard. Students and professionals must stay active in the organizations that represent us in order to ensure equal representation and to strive for a better future. Available MLS programs should strive to promote organizations that represent the field (ASCLS, ASCP, etc.) as early as possible. Hopefully making students aware and peaking their interest early on. Getting the incoming generation involved now will ensure positive legislative outcomes for the field in the not so distant future.

As a whole, more needs to be done in order to get people talking about the Medical Laboratory Sciences career field. The MLS professional retirement crisis is already upon us and is an issue that needs to be tackled head-on. Utilizing avenues from career fairs, to online advertisements, and word of mouth need to be the fields, as well as the Universities, top priority. No effort is too small. Programs need to be meticulous about the ways in which they choose to advertise their

programs. Idaho State Universities MLS program has an average student applicant age of 26.4 years of age, therefore newspapers and catalogs are not an effective way to reach their target audience. As discussed at length above, our data suggests that career fairs and majors/minors fairs are the most effective avenues of recruitment. Aside from those, the next best option is social media outlets (Facebook, Instagram, YouTube, etcetera), or other internet platforms (online newspapers, Quizlet, Reddit). The above avenues in conjunction with one another are going to be far more profitable, creating ads on these types of platforms that are both bright, interesting, and engaging is how the target audience can be reached whether it be physically, or via the internet.

To summarize the above, the best marketing strategy for the Medical Laboratory Science program comes down to incorporating multiple different strategies into one, while simultaneously having different strategies in play. Career fairs and major/minor fairs need to have the MLS program represented there any time that the opportunity presents itself. If at all possible, a career fair should never be missed by the department. While utilizing that event, the people in attendance want to see: bright colors, interactive or hands on activities, experienced staff, and a friendly face. Even if an event like this is occurring, internet platforms still need to be utilized. Creating advertisements for the program using the same strategies as above (bright, interactive, with friendly help available if needed. All of these outlets in conjunction with each other will yield the highest recruitment values. Next, helping to encourage involvement of all MT's in the different societies available to them will help to keep the fields voice heard, this will translate to many different aspects of the laboratory including, but not limited to, better work

environments, benefits, and so forth. In turn aiding laboratories in increasing the retention rates at their facilities.

The limitations of this study are similar to most survey-based research. It does not follow trends in real time, only over short periods. It also cannot track cause and effect with certainty. It also gives a fairly limited picture of a small sample population, not a look at the whole possible population. Continually research needs to be done on this topic so that we can narrow down exactly when the majority of Medical Laboratory Scientists will retire (economic push back from 2007), to more specifically identify the best avenues of recruitment per age group applying for MLS program, and to look at other program data as the above data was specific for Idaho State Universities MLS program. If more programs are researched it will give a more cohesive look at the status of MLS programs across the United States.

Appendix A

IDAHO STATE UNIVERSITY MASTER THESIS PROJECT QUESTIONNAIRE

THESIS: RECRUITMENT IN MEDICAL LABORATORY SCIENCES; ISSUES, STRATEGIES, AND THE FUTURE.

1. Year of birth:

2. Gender:

- ☐ Male
- ☐ Female
- ☐ Would prefer not to answer

3. To which racial or ethnic group(s) do you most identify?

- ☐ White
- ☐ Hispanic
- ☐ Black or African American
- ☐ Asian
- ☐ Native Hawaiian or other pacific island
- ☐ American Indian or Alaska Native
- ☐ Other, explain: _____
- ☐ Would prefer not answer

4. How did you first learn about the Medical Laboratory Science profession?

- ☐ Family member
- ☐ High school counselor
- ☐ Employer
- ☐ College counselor
- ☐ Career fair
- ☐ Program brochure
- ☐ School website/catalog
- ☐ NAACLS
- ☐ Other, explain: _____

5. At what time did you decide to pursue the Medical Laboratory Science profession?

- ☐ Childhood
- ☐ High school

- ☐ Freshman/Sophomore year of college
- ☐ Junior/Senior year of college
- ☐ Post Baccalaureate
- ☐ Other, explain: _____

6. Did you ever attend summer camp (or similar) that influenced your career direction?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

7. If applicable, who most influenced your choice to pursue a career in the Medical Laboratory Sciences? If not applicable please write N/A.

8. If applicable, when did you receive your Medical Laboratory Sciences degree? If not applicable please write N/A.

9. If applicable, where did you receive your Medical Laboratory Science education? If not applicable please write N/A.

10. What level of Medical Laboratory Science education did you receive?

- ☐ Associate degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Ph.D.
- ☐ Completed some post graduate
- ☐ Would prefer not to answer

11. What position do you hold in the Medical Laboratory Science field?

- ☐ Medical Technician
- ☐ Medical Laboratory Scientist
- ☐ Lab Manager
- ☐ Lab Director
- ☐ Professor/Faculty
- ☐ Retired
- ☐ Student
- ☐ Other, explain: _____

12. How long have you been in the Medical Laboratory Science field?

- ☐ 0-5 years
- ☐ 5-10 years
- ☐ 10-15 years

- ☐ 15-20 years
- ☐ >20 years

13. How important is a career ladder to you?

- ☐ Very important
- ☐ Somewhat important
- ☐ Neutral
- ☐ Somewhat unimportant
- ☐ Very unimportant

14. In your opinion, what is the most appealing career aspect about Medical Laboratory Science?

- ☐ Fast pace
- ☐ Changing environment
- ☐ Job flexibility
- ☐ National demand
- ☐ Benefits
- ☐ Shift flexibility
- ☐ Other, explain: _____

15. In your opinion, what is the least appealing career aspect to you about Medical Laboratory Science?

- ☐ High stress
- ☐ Salary
- ☐ Limited upward growth
- ☐ Limited patient contact
- ☐ Other, explain: _____

16. Where do you receive most of your advertising information?

- ☐ Social media (Facebook, YouTube, Twitter, etc.)
- ☐ Television
- ☐ Newspaper/magazines (printed or online)
- ☐ Other, explain: _____

17. How much time do you spend watching TV, reading newspapers/magazines (printed or online), or engaging in social media (Facebook, YouTube, Twitter, etc.) daily?

- ☐ <30 minutes

- ☐ 30-45 minutes
- ☐ 45-60 minutes
- ☐ >60 minutes

18. Advertising information influences routine decisions I make (restaurants choices, grocery store choices, bank choice, events to attend):

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Neutral
- ☐ Somewhat disagree
- ☐ Strongly disagree

19. What do you consider creates memorable advertising?

- ☐ A jingle
- ☐ A catch phrase
- ☐ Video or image content
- ☐ Humor
- ☐ Other, explain: _____

20. What, in your opinion, is the best recruitment tactic to get students into the Medical Laboratory Science program? Examples: Career or major/minor fairs, flyers/ brochures, videos, etc.

21. Have you ever participated in a career fair, major/minor fair, or similar activity?

- ☐ Yes
- ☐ No
- ☐ Not applicable

22. If applicable, was the Medical Laboratory Sciences profession represented at a career or major/minor fair you attended? If not applicable please write N/A.

23. In your opinion, what are the most attractive features of a booth at a career fair, major/minor fair, or similar? Examples: giveaways, games, brochures, hands-on activities, current students, experienced faculty, colorful posters.

24. Underrepresented racial and ethnic groups in Idaho represent a potentially large target population for recruitment.

- ☐ Strongly agree
- ☐ Agree somewhat
- ☐ Neutral
- ☐ Disagree somewhat
- ☐ Strongly disagree

25. If you had to choose an incentive in which to allocate funds in hopes of recruiting more Medical Laboratory Science students what would it be?

- ☐ Grant programs
- ☐ Scholarships
- ☐ Loan forgiveness
- ☐ Better marketing strategies
- ☐ Other, explain: _____

26. In your opinion, what is the most marketable aspect of working in the clinical lab?

- ☐ Technology
- ☐ Fast pace
- ☐ Benefits
- ☐ Shift options
- ☐ Other, explain: _____

27. How did you finance your Medical Laboratory Science education? Mark all that apply:

- ☐ Scholarships
- ☐ Parents/family
- ☐ Working
- ☐ Savings
- ☐ Government financial aid
- ☐ Personal bank loans
- ☐ Other, explain: _____
- ☐ Would prefer not to answer

28. How much money do you currently owe in student loan debt?

- ☐ None
- ☐ 0-\$5,000
- ☐ \$5,000-\$10,000
- ☐ \$10,000-\$15,000
- ☐ \$15,000-\$20,000
- ☐ >\$20,000
- ☐ Would prefer not to answer

29. How would you describe your current satisfaction level with your job?

- ☐ Very satisfied

- ☐ Somewhat satisfied
- ☐ Neutral
- ☐ Slightly dissatisfied
- ☐ Very dissatisfied

30. Do you currently feel appreciated at your job?

- ☐ All of the time
- ☐ Some of the time
- ☐ Neutral
- ☐ Almost never
- ☐ Never

31. Are you currently:

- ☐ Employed for wages
- ☐ Out of work and looking for work
- ☐ Out of work but not currently looking for work
- ☐ A student
- ☐ Retired
- ☐ Other, explain: _____
- ☐ Would prefer not to answer

32. What is your current employment status? Mark all that apply:

- ☐ Full time
- ☐ Part time
- ☐ On call as needed
- ☐ Unemployed
- ☐ Would prefer not to answer

33. Medical Laboratory Scientists will always have available jobs in the state of Idaho:

- ☐ Strongly Agree
- ☐ Agree somewhat
- ☐ Neutral
- ☐ Disagree somewhat
- ☐ Strongly disagree

34. Before today, were you aware of the critical workforce shortage in the Medical Laboratory Sciences career field?

- ☐ Yes
- ☐ No

35. If you are currently employed in a lab, is your facility suffering from shortages in any areas of the laboratory?

☐ Yes

☐ No

☐ Not applicable

36. Which areas are currently suffering job shortages? If not applicable please write N/A.

37. Are there any additional questions you would like to see included in this research?

38. Do you have any comments you would like to add to this survey?

39. If you would like to give your name for possible follow up questions, please leave your information below.

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