

**Analyzing The Factors Contributing to Skill Gaps in Medical Laboratory Technology
Graduates: An Employer-Centred Perspective**

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ABSTRACT

Skill gaps among the fresh graduates have become a big concern for employers which influence the effectiveness of diagnostic services. This study was aimed to identify the factors which contributes towards this skill gap according to the employer's perception.

It was a cross-sectional study carried out on 145 field relevant individuals such as hiring managers, faculty member teaching relevant curriculum, medical laboratory technologist and individuals providing jobs. Data was collected through a questionnaire specially designed to access the impact of several factors such as curriculum content, training opportunities, exposure to regulatory standards, technological advancements on their perception which might be responsible for skill gap in the graduates. Individuals' demographic data such as age, gender and questions related to their potential job role and experience were also asked to check their relevancy to our study. Likert 5-point score was utilized to record their opinion over these factors. Data obtained was statistically analyzed using SPSS-26.

The results revealed that practical training, exposure to regulatory standards and technological advancement had strong impact on the employer's perception specially of younger age with a mean score value of 3.56, 3.71 and 3.36 respectively. Practical training was the most significant factor followed by exposure to regulatory standards and technological advancement with all p values < 0.05 . However, curriculum content alone not had significant impact on these employers' perception with p value > 0.05 .

The outcomes unveiled practical training, exposure to regulatory standards and technological advancements as key factors influencing the employer's opinion regarding graduate working capabilities and readiness for job. Implementing the strategies to balance these elements can reduce the skill gap enhancing the chances of graduate employability.

Keywords: Medical laboratory technology, skill gap, practical trainings, diagnostics, employer perception

INTRODUCTION

Medical laboratory technology is a vast field under the cap of allied health sciences which offer its services in diagnostic sector. Medical laboratory technologist are allied health workers which deal with different type of biological fluids, tissues and cells and many other biological materials and perform complex analyses on them to reach an optimal diagnosis which help the physician in timely treatment of

the disease [1]. Thus, the accuracy and specificity along with reporting on given turn around time are key factors for the success of any laboratory set up. All of which highly depends upon the technical skills and knowledge of the working faculty which are learned and gained through practice and experience. Furthermore, following standard guidelines and protocols designed by accrediting bodies further enhance the performance quality [2,3]. In recent years, the diagnostic laboratories have undergone a lot of advancements like any other field of medical sciences shifting from manual work to automation, digital health system and LIS based reporting. [4,5]. Being a back bone of health system, it generates 70% of the data which is helpful to make a clinical decision. Despite the ever-growing need of this field and its professionals, a substantial skill gap exists among the medical laboratory technology graduates as reported by many employers and institution and academic staff which believe that new graduates more often have less practical approach and critical thinking and do not exhibit professional behavior required for this setup [6,7]. The word skill gap as described by the employer refers to a disparity which exist between the competency which they possess and required for this job according to the employer expectation [8]. Several factors have been known to induce this skill gap which include the deficiencies in the curriculum which fails to deliver the knowledge regarding recent advancements, limited to no access to clinical rotations and practical training, lack of knowledge regarding the quality standards designed and aligned by accrediting bodies and less awareness of time-to-time advancement in technologies among the graduates [9–11]. So, these factors can be addressed and controlled to achieve an idealistic man force capable of working in this crucial setting.

Problem Statement

Despite of the fact that all the academic institutions have a well-prepared structure and follow an up-to-date curriculum design with a fully set standards still the employers of the working sector are not satisfied with the performance of entry level graduates and claim that recent graduates do not have main skills required by the working industry[12]. In the past various studies have done in which it is reported that the recent graduates do not have major skills like critical thinking, problem solving skills, knowledge about Quality Management system and advance technologies [13,14]. But there is very limited research on the employer's perspective and the main factors which directly causes these gaps. This study aims to address this gap by identifying these factors which according to an employer's perception are responsible for the skill gap among medical laboratory technology graduates.

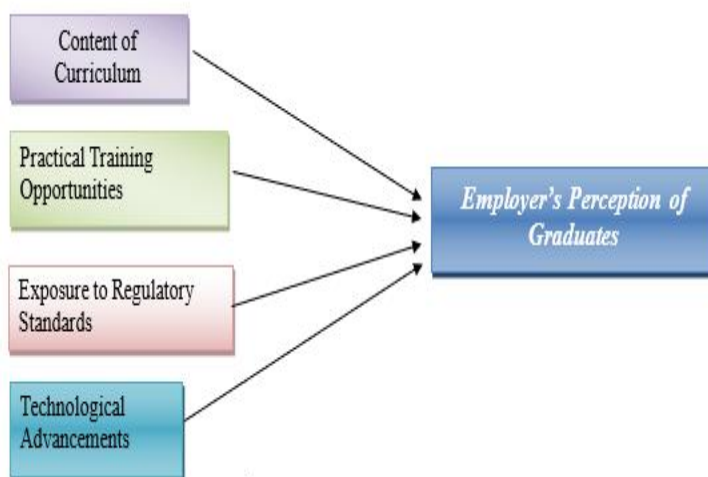
Objectives of the Study

This study was carried out to analyze the impact of curriculum content, practical training technological advancements on the competency of the laboratory associated graduates and their role as perceived by employers in the development of skill gap. The primary objectives of this study are:

- Impact of curriculum content: Evaluate the employer's perception regarding the curriculum content if it aligns with skills required at workplace.
- Impact of practical training opportunities: Analyze if practical trainings provided during studies have played a significant role in the development of working skills according to an employer.
- Impact of Exposure to regulatory standard: Understand how the exposure to Regulatory Standards affects individual's ability to perform at their practical life according to employer's perception.
- Effect of technological advancements on Employer's perception: Analyze the effect of technological advancements on the skills of graduates and employers' perception.

Theoretical Framework

This study identifies the potential factor such as curriculum content, practical training technological advancement which influence the perception of employers regarding young graduates thus decreasing the job chances. Several studies so far have discussed the importance of curriculum content and practical training in the lab related skill development in the young graduates. As inclusion of practical trainings in course content strengthen the practical approach, develops critical thinking and problem-solving skills in the graduates helping them to work effectively in laboratory afterwards[15,16]. Additionally, exposure to standard guidelines and regulatory bodies is not only important for the personal safety. It also ensures the implementation of standard protocols thus providing the same results with specificity and accuracy under same conditions. Similarly, in modern era many technological advancements are taking over the old conventional techniques in laboratory set ups to minimize the error ratio and reduce reporting time[17,18].



Deficiencies of practical content in curriculum, limited practical opportunities and least awareness of regulatory standards and technological advancements can seriously affect the working capabilities of lab technologist resulting in skill gap and decrease their chunks of getting job by shaping the perception of employers regarding them. Our study was an effort in this regard to identify main key factors which results in the skill gap among graduates and influence the employer's decision regarding their hiring so rate of unemployment among these graduates could be controlled.

MATERIAL AND METHODOLOGY

Individuals belonging to any related field of medical laboratory technology including employers, hiring management, faculty involved in teaching and designing the relevant curriculum and graduates having less than one-year experience were added in this study.

A total of approximately 145 individuals from different diagnostic laboratories, hospitals and educational institutes are selected and their perception regarding these factors was evaluated.

Data Collection Method

A questionnaire was developed in this regard comprising of various sections which include the demographic data of the participants such as participant's personal information and job details and sections relevant to certain factors such as curriculum content and its relevancy to job, training opportunities and its impact on job, knowledge and familiarity with new technologies in diagnostics and its usage. Participants were also asked if they observed any knowledge of safety guidelines and other standardized protocols among graduates necessary to provide quality diagnostic services. Lastly employer's general perception regarding skill level and deficiencies of graduates were solicited. Participant's perception regarding each of these factors was evaluated using 5-point Likert score.

Data Analysis Technique

Data obtained was coded and analyzed using SPSS26 and results were evaluated. Descriptive statistics such as mean, median and mode were applied to Likert score obtained for each factor. ANOVA testing was applied to check if any of these factors have significant impact on employer's perception considering a value of 0.05 as significant. Correlation analysis was carried out to check the strength of relationship between these factors and employer's perception with a value of ≤ 0.01 considered as statistically significant.

RESULTS

It was observed that women were more optimistically involved in this study as compared to male with more of the participants underlying between 21-30 year old age group. Majority of the individuals giving their perception were graduates. The demographic details of the participants are shown in Table 1.1

Table 4.1: Demographic characteristics of Individuals Participated in Study

Attributes	Sub Attributes	Frequencies (n)	Percentage (%)
Age	Less than 20 Years	5	3.4
	21 - 30 Years	95	65.5
	31 – 40 Years	39	26.9
	41 Years plus	6	4.1
Gender	Male	71	49.0
	Female	74	51.0
Qualification	Bachelors	77	53.1
	Masters	62	42.8
	Phd	6	4.1
	Others		
Working Sector	Hospital	51	35.2
	Diagnostic laboratory	54	37.2
	Research Institute	17	11.7
	Academia (Teaching/Training)	16	11.0
	Others	7	4.8
Current job	Recent graduate	22	15.2
	Medical Laboratory Technologist	71	49.0
	Lab Manager	21	14.5

Experience	Faculty/Educator	17	11.7
	Employers or Hiring Managers	14	9.7
	less than 1 years	28	19.3
	2 - 5years	68	46.9
	6 - 10years	34	23.4
	11- 15years	10	6.9
	Above 15 years	5	3.4

Likert scoring utilized to check the perception of employers against various factors responsible for skill gap among young graduates revealed that curriculum had least mean value while practical training opportunities had highest mean value indicating that lack of practical training opportunities was most common reason according to their perception responsible for skill gap as shown in Fig 1.1.

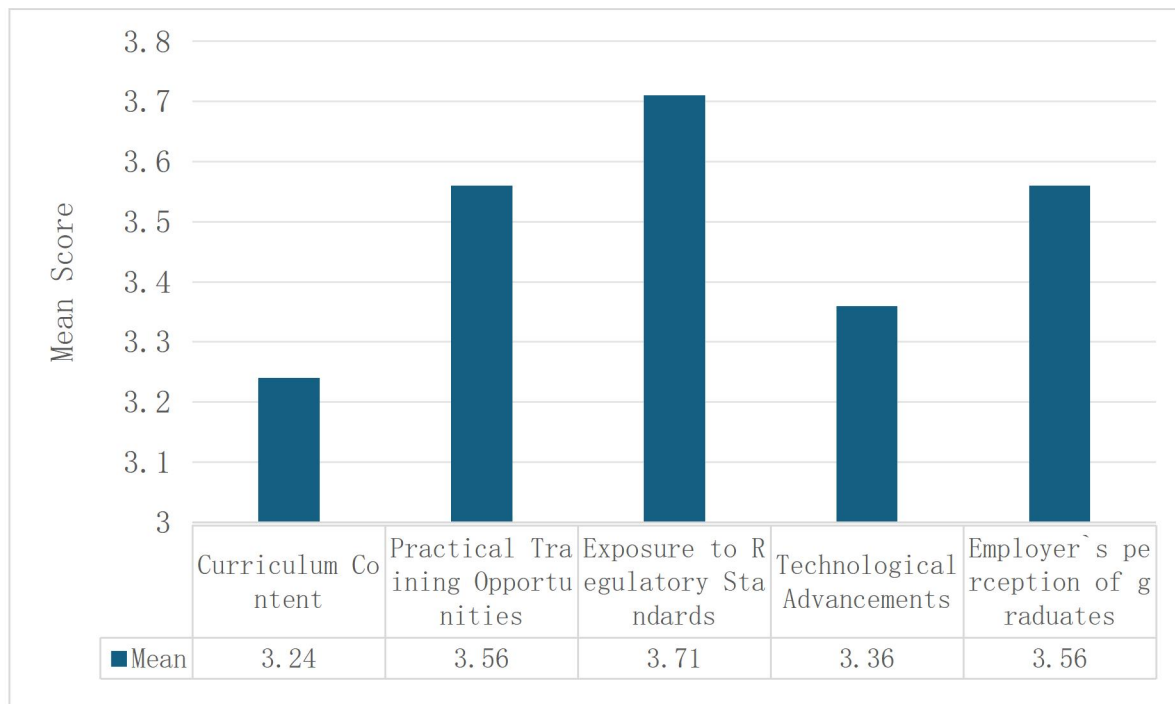


Fig 1.1 Mean Score of Factors Contributing to Skill Gaps

Furthermore, Median score analysis of these factors showed a value between 3 and 4 which indicated the positive perception among all the participants. Most variation among the score was found between curriculum content and technological advancements suggesting a high ratio of variable response of employers against these two factors. While a consistent similar answer was observed in case of practical opportunities and exposure to regulatory standards as shown the Fig 1.2

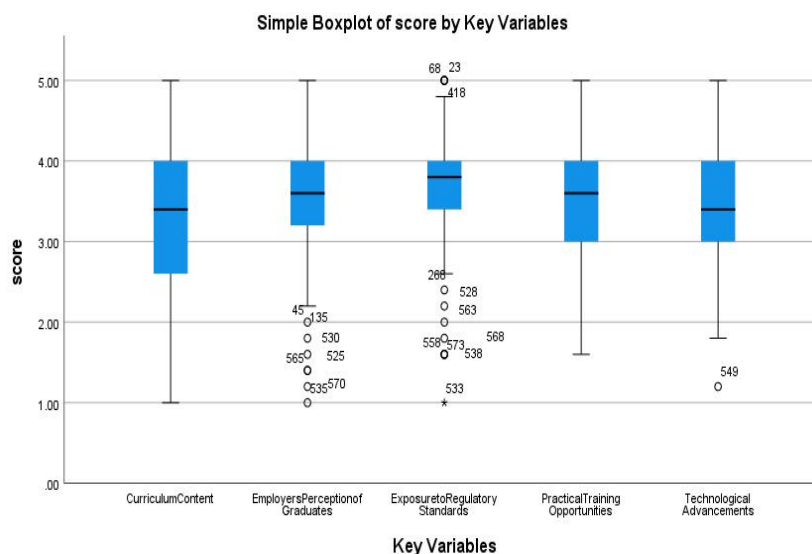


Fig 1.2 Box Plot Depicting Variation in the Score of Skill Gap Factors

Response of individuals working in different sectors having different designation ranging from junior post as recent graduates to hiring managers were evaluated. Analysis of variation in their response was analyzed to check if the people having different job description had different sense of perception regarding any factor. The median score of recent graduates was 3.5 depicting more variation in their perception regarding these factors. Most consistent response was observed in case of laboratory technologist and faculty members. While high median score was observed in case of hiring managers and people offering lab jobs as shown in Fig 1.3.

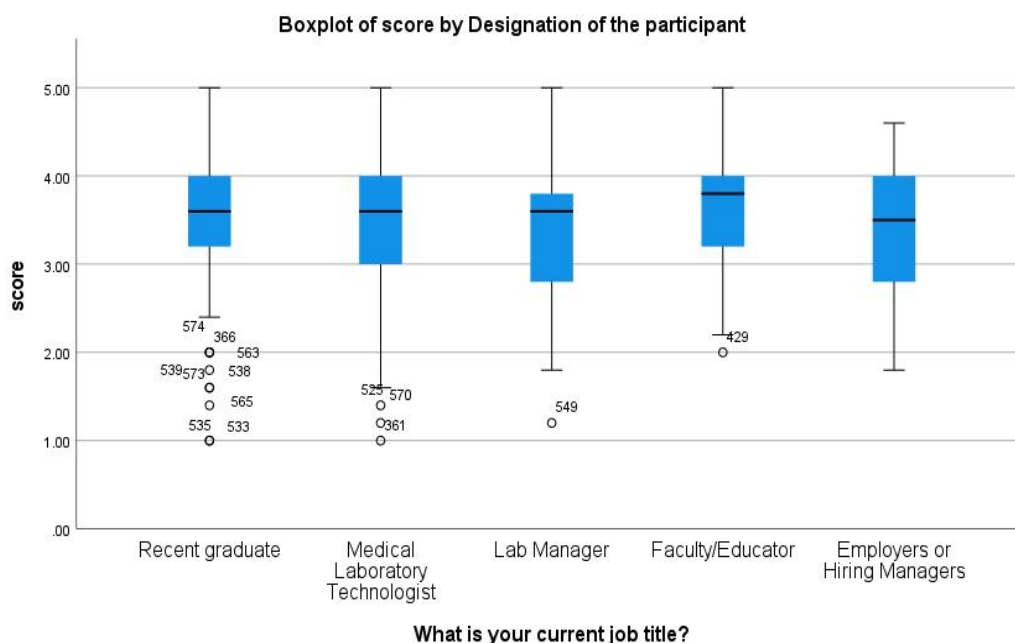


Fig 1.3 Box Plot Depicting Variation in the Score by Designation of Participants

ANOVA testing used to check these factors impacts on employers' perception revealed that curriculum content had no significant impact on employer perception as p value was greater than 0.05 ($p=2.86>0.05$). While in case of other factors such as practical training opportunities, exposure to regulatory standards and technological advancement a significant impact was observed on employer perception with all p values <0.05 . Similarly, correlation analysis revealed no correlation between curriculum content and employers' perception against graduate as ($r=0.089$; $p>0.01$). while a strong correlation was observed among exposure to regulatory standards and **technological advancements** and employer's perception (**$r = 0.536$, $p < 0.01$; $r = 0.535$, $p < 0.01$**). However, this correlation was weak in case of practical training opportunities ($r=0.219$; $p<0.01$).

DISCUSSION

Laboratory is back bone of health sector and medical laboratory technologist are an integral part of this diagnostic set up. Every year millions of students around the globe graduate as medical laboratory technologist to pursue their career in diagnostic setup [19,20]. However, due to job competition and employer's perception of lack of practical skills in these graduates result in limited number of hiring [21,22]. Several factors affect the perception of employers towards these graduates which they often describe as skill gap such as observed in our case where practical training opportunities, exposure to regulatory standard and knowledge of technical advancements significantly affected the employers, hiring entities, lab technologists, and faculty members perception specially those belonging to younger age group. Several studies have reported the importance of practical approach and clinical rotation along with studying the course content encouraging to enhance the practical training opportunities and awareness to regulatory guidelines to prepare the new man force for the laboratory environment [23,24]. Similarly, lack of knowledge regarding the new technologies has been also observed to influence the employer's perception towards fresh graduates perceiving it as substantial skill gap among these young technologists. Many studies reported the automation induction and its effect on medical laboratory technologist as it not only decreases the need of workforce but require expert to run and a person unaware of it might have limited job opportunity [25–27]. Thus, addressing these factors and implementing the strategies to overcome them such as building the training opportunities and providing knowledge related to new technologies in lab sector along with spreading awareness regarding various regulatory bodies its implementation and effects on lab results can help in changing the perception of the employer's regarding graduates thus enhancing the job opportunities for them.

CONCLUSION

The study highlights the role of practical training, exposure to regulatory standards and technological advancements in shaping the employers' views regarding the graduate readiness on work. Thus, working on these factors can significantly help in building a more skilled workforce, improve the employer's perception increasing the job opportunities and strengthen the diagnostic services.

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