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Editorial

CRITICAL LOOK AT CHALLENGES IN THE MEDICAL LABORATORY SCIENCE TRAINING IN THE WORKPLACE

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INTRODUCTION

Medical (diagnostic) laboratories are essential for effective prevention, diagnosis, and treatment of communicable and non-communicable diseases. Competent and resourceful laboratory staffs (medical laboratory scientists, technical officers, phlebotomists, and pathologists) are key performers in the pathology industry. In some areas of the world, such as Australia and North America the laboratory workforce in general is becoming older, and there are challenges in finding competent young laboratory scientists to replace them upon retirement **(1, 2)**.

A medical laboratory science course needs to have a placement component (also called clinical practicum or internship) integrated into its curriculum **(3)**. The students of such programs, after a period of undertaking on-campus education and learning the theories and pre-requisite practical skills, are placed in the real-world medical laboratories where they learn the entry-level professional skills and values under the supervision of experienced laboratory staff **(4)**. As examples for the entry-level professional skills, I am referring to Units 1 to 6 in Table 1, which is the Competency-based Standards for Medical Scientists in Australia prepared by the Pathology Associations Council, Australia **(5)**.

Accordingly, there is a shared responsibility on the higher education system (universities and vocational institutions) and the pathology industry (teaching clinical laboratories) to help meet these educational requirements by providing quality training to the students. However, there are many obstacles and challenges in the field, which I am going to explore in this article and provide relevant solutions:

The obstacles and challenges

Currently, many medical laboratory science programs are dealing with numerous challenges that may negatively impact on the quality of the education and competency of the graduates. The types and scales of those challenges may vary from country to country, or from region to region. In this editorial article, it is not possible to cover all the issues pertinent to the medical laboratory science programs globally or even in a specific geographic area; rather I would like to focus on some common, but generally less discussed issues, which can be common in many countries. I will also provide some solutions.

1. Limitations of the curriculum

An up-to-date and professionally oriented university curriculum plays a key role in preparing the students for the industry. One of the problems, is that there are many universities that either are running generic types of biomedical science programs claiming that they are providing workforce to the pathology industry, or are offering very specialised courses (e.g. biotechnology courses) which do not have sufficient clinical perspective to meet the pathology industry's general requirements. Whilst the graduates of these less-pathology-oriented programs could be very successful in meeting specific needs of select research or pathology laboratories/ departments (e.g. biotechnology or molecular genetics laboratories), their graduates will probably not obtain the comprehensive entry-level attributes required by the industry **(1)**.

One way to ensure high standards of medical laboratory science programs is through accreditation of the programs through national and international professional organisations. For example, in Australia the Australian Institute of Medical Scientists (AIMS) holds the responsibility of accrediting undergraduate and postgraduate university programs **(6)**, and in the UK, the Institute of Biomedical Science (IBMS) **(7)** have a similar role. Therefore, in my view some type of compulsory accreditation processes must be implemented to ensure the high quality of the programs.

2. Insufficient or inefficient laboratory trainers in the workplace

In the context of a pathology laboratory, medical laboratory scientists (MLSs) are typically involved in specialised activities such as setting up, operating, and verifying laboratory tests (automated or manual), training junior staff, and/or the day-to-day laboratory management **(3, 4)**. From the perspective of human resource availability, there is a shortage of qualified and skilled MLSs in many countries due to reasons including but not limited to limited number of accredited programs, decreased general interest in becoming a medical laboratory scientist (MLS) due to bad working conditions or low salaries, or ironically, due to increasing governmental regulations in the case of the USA **(1, 8, 9)**. There are some solutions to these problems such as increasing the accredited programs' capacities by allocating more resources to them and improving working conditions and salaries of the scientists.

Another problem in this category is limitations in ability, availability, or the desire of the MLSs for training students in their workplaces. Some of the causes could be:

- Lack of teaching experience by MLSs **(10)**;
- Poorly prepared students are placed in the laboratory, which demands huge time commitments from the MLSs **(4)**; and
- Lack of recognition of the MLSs' educational roles in the laboratory **(10)**.

I believe, a solution to this issue would be to create and support a new type of job position in the laboratory as a "Medical Laboratory Educator". To fill these kinds of positions, highly experienced MLSs who have been trained for training, should be selected. Under these circumstances, the Medical Laboratory Educators (MLEs) will be able to contribute to teaching activities in addition to their day-to-day technical responsibilities **(10, 11)**, with considerations given toward appropriate workload allocation. The educational activities provided by these MLEs, could in fact go beyond student training and contribute to the overall educational activities within the laboratory or the larger organisation. Examples of the activities can be:

- Developing the laboratory's testing protocols **(11)**;
- Training junior staff in the laboratory **(11, 12)**;
- Communication with other healthcare professionals such as registrars, general practitioners, and nurses about laboratory testing **(13, 14)**;
- Liaison with the university's placement convenors and providing feedback to them **(4,10)**.

3. Insufficient communication between the higher education sector and pathology industry

Effective and productive communications between MLEs or their lab managers and the university educators and/or program directors can play a key role in determining the efficacy of the university programs, especially with regards to the technical currency of the programs and their graduates **(4, 14)**. The solution for this problem can be sought through implementing an effective university-industry collaboration scheme explained in the following paragraph.

A proposed integrated solution to overcome the educational barriers

Having mentioned the above barriers to effective workplace training of the medical laboratory science programs, and the potential solutions, most of the solutions can be provided in an integrated and coordinated way through holding joint workshops and seminars between the two educational stakeholders (i.e. the university educators and the pathology professionals). I am suggesting a model of university-industry collaboration here (Figure 1). In this model, the university takes the initiative by holding regular (e.g. annul)

MLE workshops, in which the MLEs meet with the program directors, placement unit convenors, and other MLEs form same or different laboratories. The workshops may comprise lectures (presented by the university lecturers or MLEs themselves), case studies, and group discussions around placement and student learning matters. In addition, the MLEs share their educational or administrative experiences with

other participants and provide feedback to the university's program director on student preparedness. Also, as part of the MLE workshops, the MLEs attend educational seminars run by experts of teaching and learning in higher education and upgrade their teaching skills. As indicated in Figure 1, the following outcomes are achievable:

- The MLEs will consolidate their teaching skills.
- The program director will receive feedback from the industry experts regarding the technological advancements in the industry and update the course curriculum accordingly.

CONCLUSION

The quality of workplace student training in the medical laboratory science programs can be improved by updating program curriculum, empowering MLEs, and improving communications between the higher education sector and the pathology industry. The educational roles of the MLEs should be recognised and be given credit. Additionally, the universities can facilitate the interactions of MLEs and the university academics, by holding regular MLE workshops during which the MLEs can develop higher-level teaching skills, and at the same time, provide the program directors with expert advice on the course content.

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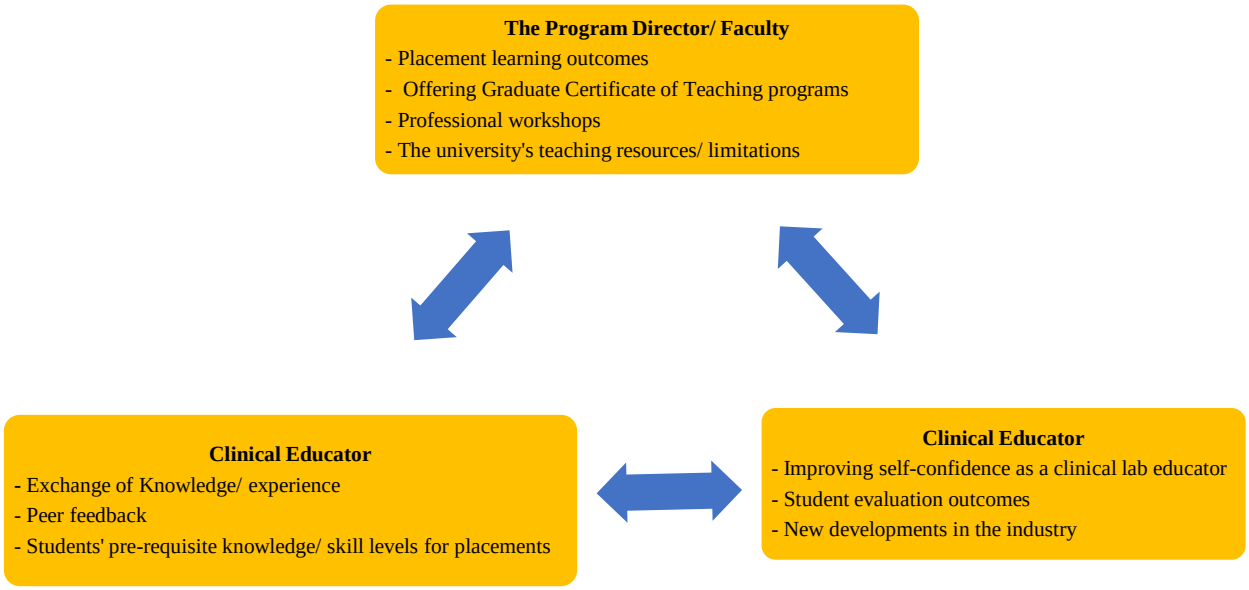
Table 1: Entry-level professional competencies as stated by the Pathology Associations Council (Australia)

Professional Standards Unit	Competency
Unit 1	Collection, preparation, and analysis of clinical material.
Unit 2	Correlation and validation of results of investigations using knowledge of method(s) including analytical principles and clinical information.
Unit 3	Interpretation, reporting and issuing of laboratory results.
Unit 4	Maintenance of documentation, equipment, resources, and stock.
Unit 5	Maintenance and promotion of safe working practices.
Unit 6	Professional accountability and participation in continuing professional development.
Unit 7	Responsibility for Medical Science practice including test selection, development and use of laboratory investigations.
Unit 8	Liaison with health workers and others to continuously improve the service.
Unit 9	Participation in education and training of health workers and others.
Unit 10	Contribution to advancement of knowledge and improvement of laboratory practice.

Figure 1: The proposed interactions among the placement stakeholders



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