CSMLS SCSLM

Canadian Society for Medical Laboratory Science
Société canadienne de science de laboratoire médical

Simulation and Clinical Placements

Current State of Medical Laboratory Science Programs

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Simulation and Clinical Placements: Current State of Medical Laboratory Science Programs

Background

CSMLS acknowledges the importance of innovative learning environments and hands-on experience and practice through clinical placement in ensuring the expertise of the next generation of medical laboratory workforce. There has been a long-standing debate on the use of simulation to enhance and/or replace clinical practica. Research in nursing and physician education has shown benefits in the use of simulation as well as the potential to reduce the duration of clinical placement requirements. Replication of such data as it applies to medical laboratory science is essential. CSMLS would like to contribute by moving the medical laboratory science programs and the medical laboratory profession (Medical Laboratory Technologist and Medical Laboratory Assistant/Technologists; MLT and MLA, respectively) to the forefront of this investigation. This project used rigorous research methodology, conducting a systematic and comprehensive review at a national level. The current survey is the initial step in generating viable data for our programs and providing us the prospect of sharing and using simulation as a more effective educational modality in the clinical phase of our programs.

Purpose

As Phase 1 of a larger initiative, the purpose of this project was to examine the structure and usage of simulation in relation to clinical placements within Canadian medical laboratory science programs (MLT and MLA). This work will set the foundation for Phase 2 – a constructive national discussion with educators determining the true value of simulation for our profession, the ability to create and use standardized simulation curriculum, determining research needs, and contributing to the continued advancement of our programs/profession.

Methodology

In an environmental scan, an online survey was disseminated to all accredited and those registered to be accredited, programs in Canada that are providing at least one medical laboratory science program to graduate students for future careers as MLTs or MLAs. Emails were distributed to the Program Coordinator (and forwarded to the necessary individual) in each College/Institute to announce the project and its associated information. The survey was disseminated at three time points to allow programs the opportunity to complete it within the resulting participation grid (accredited programs, registered for accreditation, any remaining program requests to complete the survey that had missed the earlier opportunities). Follow-up calls and emails were made by the Project Team to respond to any outstanding questions identified in the survey when deemed necessary.

A total of 40 Colleges/Institutes were contacted to participate in this survey. Of these, 11 did not participate and it was recognized that these programs were no longer accredited (3) or currently registered to be accredited (5). Only three accredited programs did not participate. Colleges/Institutes were allowed to provide information regarding their entire program or sub certification programs (Clinical Genetics, Diagnostics, Cytotechnology) as they deemed fit; however, these were combined in the global results. The bridging programs in Canada were separately recorded in the dataset from MLT and MLA programs.

Results

Program Descriptions

Of the 30 participating Colleges/ Institutions, there were a total of 37 programs represented (two bridging, 13 MLA and 22 MLT). The length of the programs varied between the groups:

- MLT programs ranged from two-four years (4-10 semesters)
  - two-year (n=3)
  - two and a half year (n=5)
  - three-year (n=12)
  - four-year (n=2)

- MLA programs were substantially shorter at 19-44 weeks (5-11 months).
  - five to five and a half months (n=2)
  - seven months (n=3)
  - eight and a half to nine months (n=4)
  - ten month (n=2)
  - eleven month (n=2)

As there are only two bridging programs in Canada, descriptive statistics have not been provided at this time. The bridging program results, however, have been included in the simulation and clinical placement information where provided as these components are vital to their curricula. Clinical Genetics and Diagnostic Cytology programs were also represented in the dataset.

The MLT programs indicated that 50% (11/22) provided advanced studies for the general MLT at their College/Institute.

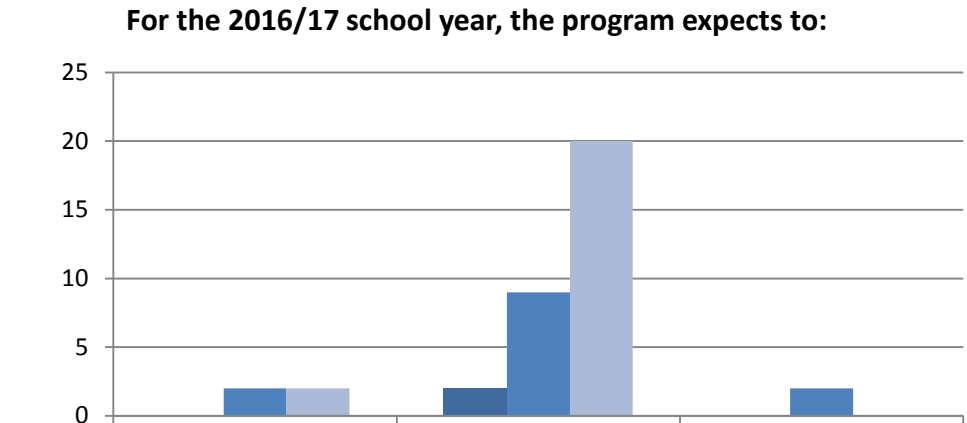
As indicated by the Colleges/Institutes, for the student year 2015-16, there were 26 bridging program seats, 556 MLA program seats and 954 MLT program seats available for students (representing approximately 2%, 36%, and 62% respectively of the total 1536 seats available). The majority (78%, 29/37) of programs were required to have a student wait list for entry to their program, with 77% for MLT, 77% for MLA and both bridging programs indicating 'yes' to the question.

Table 1: Program Wait List

For the 2015/16 school year, were students placed on a wait list for entry to the program?	Bridge	MLA	MLT	Total
No	0	3	5	8
Yes	2	10	17	29
Grand Total	2	13	22	37

Although wait lists were significant, programs indicated that they were highly likely (84%, 31/37) to maintain the current number of seats into the following student year (2016-17) with only one program indicating a desire to increase seats. Of the four programs that stated they would likely be decreasing seats, 45 seats were expected to be lost for MLA programs and 6 for MLT.

Graph 2: Change Projection of Academic Seats for 2016-17 Year



	Decrease the number of seats	Keep the number of student seats the same	Increase the number of student seats
Bridge	0	2	0
MLA	2	9	2
MLT	2	20	0

Staffing structure varied greatly between programs with some indication that program size influences staffing needs as indicated in the data. Alternative reasons would need to be derived from the programs themselves. Nonetheless, there was unequal distribution of student to total instructor and staff ratios. It should be noted that programs indicated different staffing models in their comments, which may explain the variability.

MLT programs with approximately 50 or less students were more likely to have total instructor/staff to student ratio around 2:1. Programs with more than 50 students had varied ratios ranging from 3-11:1, which may be associated with differences in human resource sharing agreements between departments.

- MLA programs were varied regardless of student numbers, ranging from approximately 1-11:1.
- Bridging programs were consistent utilizing approximately a 2:1 ratio.
- When examining the state of full-time instructors to student ratio, differences were also noted.
- MLT programs with less than 20 students were more likely to offer instructor to student ratios of 1-2:1. Programs with approximately 20-50 students, had 5-6:1 ratio and programs with greater than 59 students had variable ratios range between 4-22:1.

Table 3: Program Personal Assignment

Program Personnel	Non/Dedicated	Full or Part Time	Bridge	MLA	MLT	Grand Total
Instructors/Faculty		Full Time	0	25	190	215
		Part Time	15	30	68	113
Support Staff	Dedicated	Full Time	0	2	29	31
	Non-Dedicated	Full Time	3	10	24	37
	Dedicated	Part Time	1	6	11	18
	Non-Dedicated	Part Time	1	8	3	12
Support Staff who are MLTs/MLAs *(subset of total support staff)*	Dedicated	Full Time	0	0	23	23
	Non-Dedicated	Full Time	0	0	6	6
	Dedicated	Part Time	0	5	7	12
	Non-Dedicated	Part Time	0	2	1	3
Grand Total*			20	81	325	426

**Excludes rows in green.*
***Not all programs provided this information*

Clinical Placements

Of the 37 programs, 35 provided information as to whether their curriculum includes a clinical placement with 34 providing additional details. These programs all indicated clinical placement opportunities, except for one of the bridging programs. As there was only one bridging programs in this portion of the analysis, it has been excluded from this section.

Table 4: Percentage of Program Component Allocation

	MLT Programs			MLA Programs		
	Didactic	Practical	Clinical Placement	Didactic	Practical	Clinical Placement
Min	26%	0%	10%	34%	0%	2%
Max	74%	50%	59%	70%	42%	49%
Average	40%	26%	34%	51%	22%	26%

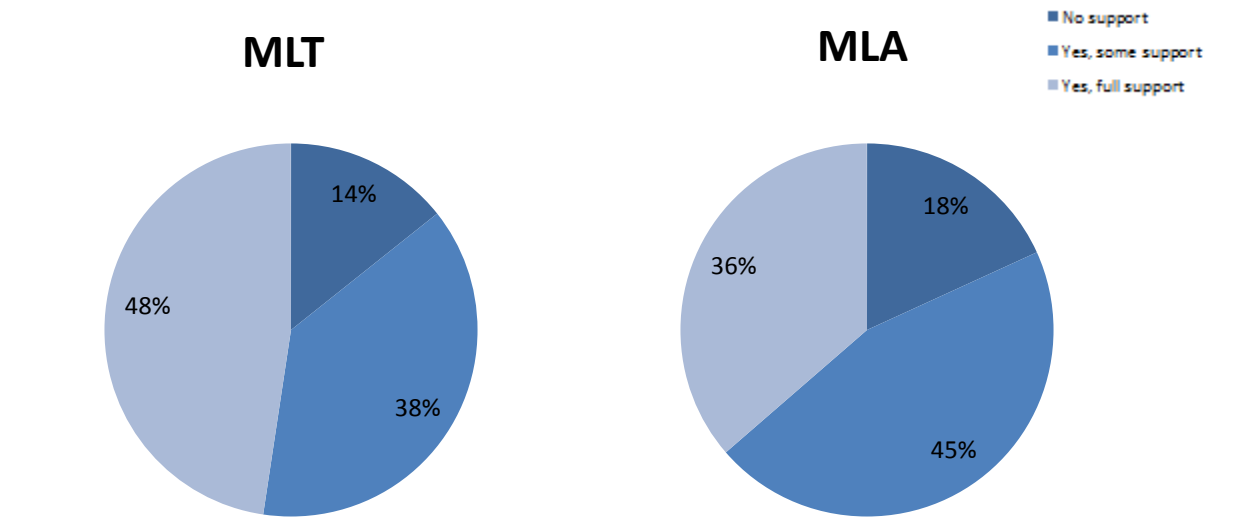
From the table above, it is possible to demonstrate the variability in program allocation for the three teaching methodologies of didactic, practical and clinical placement experience. Three MLT and one MLA program indicated 0% allocation to the practical component of their local program. There is a higher percentage of clinical placement emphasis within MLT programs compared to MLA programs, resulting in a percentage tradeoff associated with didactic learning (i.e., the greater the clinical placement percentage the more there is a decrease in didactic learning). The total number of hours assigned to the clinical placement is indicated in Table 5. Given the shorter MLA programs overall, it is not surprising that clinical placement hours are less than MLT programs.

Table 5: Clinical Placement Hours per Program Type

	MLT Programs	MLA Programs
Min	616	150
Max	1760	354
Average	1140	251

MLT programs focused their clinical placement hours in the second and third years of their programs with varied usage between semesters. Only one program indicated a clinical experience within the first year. In regards to dedicated College Instructor/Faculty to assist students in their clinical placements, the programs described different levels of support, with MLT programs receiving greater support overall than MLA programs ('some' or 'full').

Graph 6: Percentage of dedicated College Instructor/Faculty to assist students in clinical placements



Each College/Institute was asked if the number of clinical placements they had for their programs was 'enough' or not. Of the respondents, 23% (7/31) suggested that they did not have enough clinical placements and only 6% (2/31) programs were in a position to say they had more than enough, resulting in the vast majority just meeting demand (71%, 22/31). One respondent stated, "I indicated that we have sufficient clinical placement spaces which is always true; however, it often takes a great deal of time and energy to secure the last few spaces." A similar comment was also made by another participant, "We currently have enough placements for our students, but it is often a struggle because most want to stay in urban centres."

Table 7: Number of Clinical Placements – Program Needs

Overall, the number of clinical placements for the program is:	MLA	MLT	Grand Total
Not enough to satisfy program needs	3	4	7
Enough to satisfy program needs	6	16	22
More than enough to satisfy program needs	2	0	2
Grand Total	11	20	31

For the programs that did not have enough clinical placements, on average they required five additional clinical placement settings (locations) and seven student placements (student spots), although these numbers ranged as high as 10 and 12 respectively. The most difficult subject areas in which to provide experience were histotechnology, transfusion sciences and microbiology. Participant comments highlighted the inability of clinical sites to provide specialized tests, such as in this comment, "It is challenging to find clinical sites that teach to a majority of the competency areas and thus there is a need to supplement learning through simulated labs and exercises at the college. Host sites are finding it difficult to commit to clinical placements as a result of their limited human resources for preceptorship of our students."

Funding for clinical placement settings:

- Thirteen programs do not provide funding to clinical sites (self-funded)
- British Columbia and Quebec respondents indicated there is a provincial funding model
- Two programs indicated clinical placements are funded through student tuition
- Four programs indicated the College/Institute provided a stipend per student (or referenced generally to funding)
- Two programs indicated 'other'

Within this section of the survey, one program identified a potential quality issue that was also discussed in other comments by participants later in the survey, as well as within telephone call follow-up. The concept of quality was a contentious subject with participants indicating 'enough' to meet demand but suggesting or directly indicating that the current state of the health care system was burdensome for their clinical staff and that quality may be suffering or likely to suffer shortly (although meeting accreditation standards at this time). Some comments reflected this, such as this one; "Sites are extremely stressed and busy. I am also concerned that the quality of the experience has diminished due to the great level of stress that trainers are under."

Given the perceived shortages associated with clinical placements and human health care resources, the survey asked the programs to discuss how they selected and contracted new clinical placement settings. For those programs where there is a possibility to find new clinical placement employers, the main strategies involved reviewing the site services provided and matching them to the required student competencies. In addition, sites are chosen based on conducting site visits, discussions with program advisory committees or appropriate institutional representatives, and/or evaluation of program needs. Comments and program discussions highlighted the need to ensure program competencies were covered across clinical placement locations. For certain programs (and not associated solely with rural based locations), there were indications that maintaining this can be difficult such as in this comment, "Ideally, look for large centres of excellence nearby that provide all necessary rotations in one location. This works most of the time but sometimes this becomes desperation to find any site that will take a student even for a single specialty". This comment speaks to the limited options some programs experience in obtaining clinical placements and the strong drive to obtain solutions for their students within the current state of the health care system.

For the Instructors/Faculty, 83% (25/30) of programs stated that they provide specific resources to train new site clinical instructors. The greatest number of resources was allocated to in-person training (20), online training (17) and PDF resource documents (15). Only six programs commented that they provided specific certification programs clinical instruction. Other indications of resources included such items as mentoring programs, site visits upon request, webinars and preceptor orientations. To ensure maintenance of educational relevance, professional development training is largely tailored to local in-services (25), professional conference attendance (25), self-taught resources (21) and academic courses (21). Only 10 programs stipulated development of specific courses for clinical training. Eighty-two percent (26/30) of programs said that they did not require Instructors/Faculty to complete clinical rotations on a periodic basis. Some comments highlighted that clinical rotations were not mandatory but highly recommended. This lack of requirements was articulated in both MLA (9/11) and MLT (17/19) programs. For the two MLA and two MLT programs that require clinical rotations, there was variability as to how often this was required (e.g., all staff worked in the field versus annual exposure).

Simulation Education

Simulation has been incorporated into medical laboratory programs since 1955, with some programs new to this approach, as educational models have changed. There was great diversity in simulation usage and definition between programs, although 69% (22/32) stated that they incorporated simulation education (MLA = 64%, MLT = 68%). As one respondent stated, "I think there is a lot of diversity in programs and also a lot of lack of understanding as to what simulation is. I think we need to really broaden what our definition of simulation is and make it specific for our programs."

The average percentage of education provided in the program that can be considered simulation (definition provided for simulation), was 23% (14; range = 1% – 65%) for MLT programs, 19% (7; range = 1% – 40%) for MLA programs, and 30% (2; range = 10- 50%) for bridging programs. General experience in using simulation by Instructors/Faculty ranged from: novice (7), competent (4), proficient (2), and expert (7). Professional development for these individuals is general conducted through local in-service activities (22), self-instruction (16) or from exposure at conferences (13). Academic courses (9) and equipment manufacturer's training sessions (8) were also noted.

The types of simulation most used by Colleges/Institutes are: student to student training, videos, and computer-based simulation. The least used forms of simulation are: standardized patients, teacher to student training on full scale mannequins and part or partial task trainers.

Table 8: Types of Simulation Used

Simulation Type	Bridge	MLA	MLT	Total
Standardized patients	0	3	7	10
Student to student training	2	6	10	18
Teacher to student training on full scale mannequins	1	4	5	10
Part or partial task trainers	0	2	8	10
Videos	2	5	10	17
Computer based simulation	1	2	8	11
Other	0	2	8	10
Total	6	24	56	86

When asked the reason why simulation was not used in specific programs, six comments were made of which four programs stated that they could not afford the time or resources to implement simulation. There was some indication of concern in three comments that simulation may be used to replace the clinical experience, although this was not a direct question within the survey.

"There are many aspects we could do at the college level, however to mimic "real life", we could not. We hear time and time again from our students; "clinical placement is wonderful and everything really comes together!"[I] would hate to have this experience replaced. Some level of clinical placement must be maintained."

"We believe that it would be exceptionally difficult for a simulated environment to completely replace the learning and experience of a real workplace environment. Additionally, the cost of setting up a fully functional simulated environment would be prohibitive for us. We do attempt to simulate aspects of clinical work in the didactic labs, however, we do not use simulation to replace any clinical internships."

This theme of simulation as a 'replacement' for the clinical experience and the indication that students should experience real life situations is important. It spotlights a potential cognitive or cultural relationship with simulation as an 'over taker', which is not specific to medical laboratory programs. An evaluation of simulation or movement towards incorporation of simulation into curricula should include an open discussion and review of the program's perception of simulation, and address the concerns with evidence-based information (see Table 9 and the need for 'Research to support simulation usage and its effectiveness'). These types of concerns and considerations were echoed in telephone conversations with various program representatives.

The Colleges/Institutes were asked the following questions, "What simulation resources does your program currently have? What resources do you realistically need to complete simulation effectively?" Respondents were required to answer 'have', 'need' or 'not applicable' to specific concepts as shown in Table 9.

Table 9: Have versus Need – Simulation

Simulation Requirement	Have vs Need	Bridge	MLA	MLT	Total
Faculty development	Have	1	5	5	11
	Need	1	2	6	9
Networking within and outside the program	Have	1	5	9	15
	Need	1	2	5	8
Access to recommended evaluation tools for specific use in simulation activities	Have	1	3	7	11
	Need	1	2	6	9
Release time to train faculty in the use of simulation	Have	0	1	1	2
	Need	1	5	11	17
Shared scenario development	Have	2	6	4	12
	Need	0	1	9	10
Access to funding to buy equipment	Have	0	4	4	8
	Need	1	1	9	11
Research to support simulation usage and its effectiveness	Have	0	2	3	5
	Need	2	4	7	13
Shared best practices	Have	2	4	8	14
	Need	0	2	6	8
Assistance inside and outside the program with simulation program development	Have	1	4	8	13
	Need	1	2	6	9
Access to expertise from other programs inside the college/university	Have	2	5	8	15
	Need	0	1	5	6
Total	Have	10	39	57	106
	Need	8	22	70	100
	Need %	44%	36%	55%	49%

Based on the needs and wants, MLT programs currently have more needs to be fulfilled for simulation requirements compared to MLA programs; however it is unknown if this is a difference in general desire to incorporate more simulation or if it represents an actual need. The most frequent reference in citing simulation requirements, suggested networking within and outside the program, access to expertise from other programs inside the College/Institute and sharing best practices. Equally high on the list included release time to train faculty in the use of simulation, research to support simulation usage and its effectiveness, and access to funding to buy equipment.

Given an almost even split between having and needing, at a national level it can be considered that some Colleges/Institutes are benefiting from better funded simulation programs than others but that overall, there is room for greater collaboration between programs to share resources/knowledge and collectively support simulation incorporation. This is further supported by 96% (22/23)[1] of programs indicating that their "program supports simulation as an effective methodology in the education of medical laboratory science students" (MLA and MLT). One respondent commented that "The program supports simulation as providing an effective transition from didactic and task-based practical activities to working in a clinical environment. The program also believes there are some advantages to simulation over clinical environments including more consistent training, better integration of theory and practice, and to ensure students are exposed to certain competencies that may be hard to obtain in a clinical environment."

In effect, the development of simulation curriculum was mainly associated with in-house curriculum development by expert faculty, purchased equipment from companies, evidence-based research and shared curriculum from another College/Institute. There is some desire to share simulation curriculum with other programs (7/22) and general uncertainty if this is possible (13/22; Respondents suggested that content ownership was outside their jurisdiction). However, there is clear inclination towards increasing collaboration as only two programs stated they would not be willing to share their curriculum.

The employment of simulation was mainly conducted onsite within the departments (76%, 16/21) with the remaining programs stating that they have a mixture between onsite and offsite experiences (24%, 5/21). Offsite locations range from the ambulatory setting (1), inpatient units (2), elsewhere in the College/Institute (5), in the field (1) and 'other' (1). For the programs that contributed, Table 10 describes how programs are using their simulation in relation to various components of their curricula including for assessment (59%), evaluation (30%) and remediation (11%) purposes.

Table 10: Simulation by Curriculum Component and Usage Intent

Curriculum Component	Educational Assessment	Evaluation (Supplement /Alternative to Clinical)	Remediation	Total
Clinical Genetics	4	3	3	10
Cytology	11	5	3	19
Generalist	88	52	16	156
Interprofessional Skills	14	4	1	19
Soft Skills	15	5	1	21
Total	132	69	24	225

*See Appendix A for a breakdown of the curriculum components

[11] If the respondent answered 'unsure' and provided a subsequent comment that directly indicated support, the participant's answer was updated to 'yes'.

The evaluation process for simulation education was conducted largely by debriefing with students (15) and using performance checklists (18).

Colleges/Institutes are most proud of their curriculum development and implementation and support from institutional leaders (administration, education) for simulation as noted in Table 11. The subsequent table demonstrated the barriers programs are experiencing when trying to increase simulation within their curricula, including lack of dedicated financial support (not simulation laboratory specific), little release time to permit proper training and development, and scarcity of funding specifically for a simulation laboratory.

Table 11: Simulation Program Strengths

Top 3 Simulation Program Strengths	Count
Curriculum development and implementation	13
Support from institutional leaders (administration, education)	12
Dedicated financial support from the operating budget	7
Instructor/Faculty training	7
Collaboration with other leading centres	5
Other	5
Dedicated support and funding for simulation laboratory	2
Simulation operator training (equipment based)	2
Research program	1

Table 12: Barriers to Increasing Simulation

Top 3 Barriers to Increasing Simulation	Count
Lack of dedicated financial support	14
Little release time to permit proper training and development	12
Lack of dedicated support and funding for simulation laboratory	10
Insufficient or no research done towards improving training	7
Insufficient Instructor/Faculty training	5
Issues with curriculum development and implementation (equipment based)	3
Lack of collaboration with other leading centres	3
Other (please specify)	3
Insufficient simulation operator training	1
Lack of support from institutional leaders (administration, education)	1

Conclusions

The use of clinical placement may be enough to meet accreditation and program requirements but there is some discussion to suggest that the limited quantity and potential impact of current human health resource and fiscal constraints on quality may be impacting some programs. Programs are doing their due diligence to meet demand but there are indications that suggest new education models may be appropriate. Whether this change incorporates more simulation or not will be dependent on a national discussion founded on the results of this study in conjunction with the survey examining recent graduate experiences within clinical placement.

Overall, simulation is supported as an incorporated component of medical laboratory science programs (MLA and MLT); however, there is a lack of standardization in its definition and use nationally. This environmental scan demonstrates the growing trend for simulation to enhance curricula as well as the need for national consensus on the direction it should take in the future. Programs are eager to understand more about simulation and obtain opportunities to grow a simulation network. However, budgetary constraints and lack of information exchange is hampering further simulation incorporation into curricula. Evidence-based research focused within the profession will help support each of these goals and provide the basis for business cases to evolve education models, as determined by the needs of students and programs within the current health care and educational constraints.

Appendix A: Simulation Usage by Curricula Component

Group	Educational Assessment	Evaluation (Supplement / Alternative to Clinical)	Remediation	Total
Clinical Genetics • Cytogenetics - Educational Assessment	1	0	0	1
Clinical Genetics • Cytogenetics - Evaluation (Supplement/Alternative to Clinical)	0	1	0	1
Clinical Genetics • Cytogenetics - Remediation	0	0	1	1
Clinical Genetics • Molecular - Educational Assessment	2	0	0	2
Clinical Genetics • Molecular - Evaluation (Supplement/Alternative to Clinical)	0	1	0	1
Clinical Genetics • Molecular - Remediation	0	0	1	1
Clinical Genetics • Specimen Prep - Educational Assessment	1	0	0	1
Clinical Genetics • Specimen Prep - Evaluation (Supplement/Alternative to Clinical)	0	1	0	1
Clinical Genetics • Specimen Prep - Remediation	0	0	1	1
Cytology • Gyne - Educational Assessment	3	0	0	3
Cytology • Gyne - Evaluation (Supplement/Alternative to Clinical)	0	1	0	1
Cytology • Gyne - Remediation	0	0	1	1
Cytology • Non-Gyne - Educational Assessment	4	0	0	4
Cytology • Non-Gyne - Evaluation (Supplement/Alternative to Clinical)	0	1	0	1
Cytology • Non-Gyne - Remediation	0	0	1	1
Cytology • Specimen Prep - Educational Assessment	4	0	0	4
Cytology • Specimen Prep - Evaluation (Supplement/Alternative to Clinical)	0	3	0	3

Cytology • Specimen Prep - Remediation	0	0	1	1
Generalist • Core Lab (Chem/Hem) - Educational Assessment	16	0	0	16
Generalist • Core Lab (Chem/Hem) - Evaluation (Supplement/Alternative to Clinical)	0	10	0	10
Generalist • Core Lab (Chem/Hem) - Remediation	0	0	2	2
Generalist • Core with Transfusion - Educational Assessment	14	0	0	14
Generalist • Core with Transfusion - Evaluation (Supplement/Alternative to Clinical)	0	10	0	10
Generalist • Core with Transfusion - Remediation	0	0	2	2
Generalist • Histotechnology - Educational Assessment	11	0	0	11
Generalist • Histotechnology - Evaluation (Supplement/Alternative to Clinical)	0	9	0	9
Generalist • Histotechnology - Remediation	0	0	4	4
Generalist • Microbiology - Educational Assessment	15	0	0	15
Generalist • Microbiology - Evaluation (Supplement/Alternative to Clinical)	0	9	0	9
Generalist • Microbiology - Remediation	0	0	3	3
Generalist • Phlebotomy - Educational Assessment	14	0	0	14
Generalist • Phlebotomy - Evaluation (Supplement/Alternative to Clinical)	0	6	0	6
Generalist • Phlebotomy - Remediation	0	0	3	3
Generalist • Specimen Prep - Educational Assessment	18	0	0	18
Generalist • Specimen Prep - Evaluation (Supplement/Alternative to Clinical)	0	8	0	8
Generalist • Specimen Prep - Remediation	0	0	2	2

Interprofessional Skills - Educational Assessment	14	0	0	14
Interprofessional Skills - Evaluation (Supplement/Alternative to Clinical)	0	4	0	4
Interprofessional Skills - Remediation	0	0	1	1
Soft Skills - Educational Assessment	15	0	0	15
Soft Skills - Evaluation (Supplement/Alternative to Clinical)	0	5	0	5
Soft Skills - Remediation	0	0	1	1
Grand Total	132	69	24	225