

Best Practices for Hospital-Based Medical Laboratory Science Programs

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Objectives

- Describe methods of structuring a hospital-based MLS program.
- Analyze best practices in hospital-based MLS education based on recent survey data.
- Evaluate changes that could be made to a hospital-based MLS program to improve staff satisfaction & student outcomes.

Nebraska Methodist Hospital Medical Laboratory Science Program

- Established in 1968
- **Program Director** – Julie Richards
- **Accept 8 students**
 - 3+1 & 4+1 students
 - Currently 4 academic affiliates
- **Admission requirements:**
 - GPA – cumulative & science/math
 - 2.5 minimum
 - 16 hours of chemistry & biology (including specific courses)
 - Statistics course
 - Transcript Evaluation Scores
 - 3 References
 - Interview
 - Essay-written on-site
- **Six (6) Clinical Instructors**
 - Bench full time & teach theory & clinical/technical for their discipline
- **\$6,000 tuition**
 - \$300 fees (background check, drug screen, printing)
 - Health Insurance
 - Students responsible for textbooks
- **50-week program (May-May)**
 - One class per year
 - One day Orientation
 - Classroom/Student Lab Phase
 - Late May to late July
 - Clinical rotations x 2
 - Rotation I (through all areas)
 - Late July to late November
 - Rotation II (through all areas)
 - Late November to early May
 - 6:30 am-9:00 pm
 - Lectures from 1:00-3:00 pm –on Tues & Thurs starting in late August through April

Nebraska Methodist Hospital Medical Laboratory Science Program

- **Instruction methods include:**
 - Face-to-Face lecture & clinical experience
 - Case Studies
 - Enrichment sites/activities
 - Management & Education lectures & assignments
 - CAI
 - Univ. of WA MTS Lab Training System, Media Lab, assorted educational CDs, etc.
 - Mock Certification Exam
 - At midterm and at end of clinical year
 - Passing grade on Mock Exam not required to graduate;
 - Used to evaluate knowledge base (without studying)

Nebraska Methodist Hospital Medical Laboratory Science Program

OUTCOMES

School Year (# of students)	Graduation Rate	Attrition Rate	Graduate Placement Rate	Certification Exam Pass Rate
2014-15 (6)	100%	0%	100%	100%
2015-16 (8)	100%	0%	100%	100%
2016-17 (8)	100%	0%	100%	100%
Rolling 3 year average	100%	0%	100%	100%
NAACLS benchmark	70%	0%	70%	75%
Outcome Measure	Description	Source of Data		
Graduation Rate	For students who enter the final half of the program & complete the program	School attendance records		
Attrition Rate	For students who begin the program, but fail to enter the final half of the program	School attendance records		
Graduate Placement Rate	For graduates who seek employment in the field or continue their education within one year of graduation	Personal updates from students to Program Director		
Certification Exam Pass Rate	For graduates who take the ASCP-BOC MLS exam within 1 year of graduation	ASCP-BOC Program Performance Report		

Mercy Hospital St. Louis School of Clinical Laboratory Science

- Established 1951
- **Program Director** – Terry Taff
- **Accept 8 students**
 - 3+1 and 4+1 students
 - Also have 2 clinical affiliates
 - Currently 7 academic affiliates
- **Admission requirements:**
 - GPA – science and math
 - Minimum 2.75
 - 4 references
 - Interview
 - 16 hours biology and 16 hours chemistry
 - Very specific courses required
 - Statistics
- **Three (3) Clinical Laboratory Educators**
 - 50/50 split with bench/school
- **\$5800.00 tuition fee**
 - \$200.00 acceptance fee
 - Not part of tuition
 - Professional liability insurance
 - Health insurance
 - Books are loaned to students
- **51 week program**
 - One class per year
 - Student laboratory
 - Late June to late November
 - 1-4 weeks for each major discipline
 - Clinical rotations
 - Late November to mid June
 - 7:30 am – 2:30 pm with lectures from 2:30-4:00 pm
 - 2 days program orientation
 - Must attend Hospital new co-worker orientation also
 - Students enter the system as non-paid co-workers

Mercy Hospital St. Louis School of Clinical Laboratory Science

- Instruction methods include:**
 - Face to face lectures
 - Enrichment sites
 - Education
 - Teach "Intro to CLS" university course on-site
 - CAI
 - MediaLab, Inc. U of WA Lab Training, Library, CDs, etc.
 - Comprehensive final examination required to receive program certificate of completion

Mercy Hospital St. Louis School of Clinical Laboratory Science

OUTCOMES

School Year (# of students)	Graduation Rate	Attrition Rate	Graduate Placement Rate	Certification Exam Pass Rate
2014-15 (8)	100%	0%	100%	100%
2015-16 (8)	100%	0%	100%	100%
2016-17 (8)	100%	0%	100%	100%
Rolling 3 year average	100%	0%	100%	100%
NAACLS benchmark	70%		70%	75%
Outcome Measure	Description		Source of Data	
Graduation Rate	for students who enter the final half of the program (clinical rotations) & complete the program		School attendance records	
Attrition Rate	for students who begin the program, but fail to enter the final half of the program		School attendance records	
Graduate Placement Rate	for graduates who seek employment in the field or continue their education within one year of graduation		Personal updates from students to Program Director or via Graduate Survey sent by School	
Certification Exam Pass Rate	for graduates who take the ASCP-BOC MLS exam within 1 year of graduation		ASCP-BOC Program Performance Report	

MS Baptist Medical Center School of Medical Laboratory Science

- Established in 1946
- Program Director** – Jennifer Knight
- Accepts up to 6 students:** 3+1 & 4+1
 - Currently 2 academic affiliates
- Admission requirements:**
 - Cumulative & Math/Science GPA= 2.7
 - GRE
 - 3 References
 - Interview
 - 16 hours of biology & 16 hours of chemistry
 - Some specific courses required
- \$1000 tuition fee**
 - No other fees required
 - Students responsible for purchasing books
- 12-month program**
 - Students classified as PRN employees & go through staff orientation
 - Not paid for work during school hours
 - Paid work is voluntary after competency checks are complete
 - No student lab or online instruction
 - 2-week orientation & phlebotomy training followed by 48 weeks of instruction
 - 730a-230p – rotation (all at MBMC)
 - 230-400p – classroom

MS Baptist Medical Center School of Medical Laboratory Science

- Instruction methods include:**
 - Lecture
 - Field trips/enrichment sites/activities
 - Management & Education capstone projects
 - CAI – MediaLab, Univ of WA Lab Training Library, assorted CD's in various rotations
 - Comprehensive final exam required to receive program certificate of completion

MS Baptist Medical Center School of Medical Laboratory Science

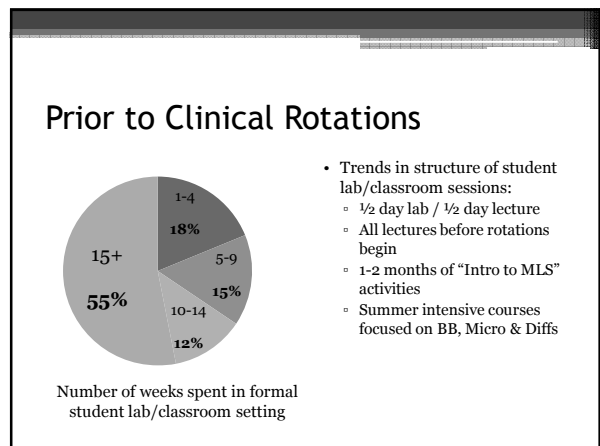
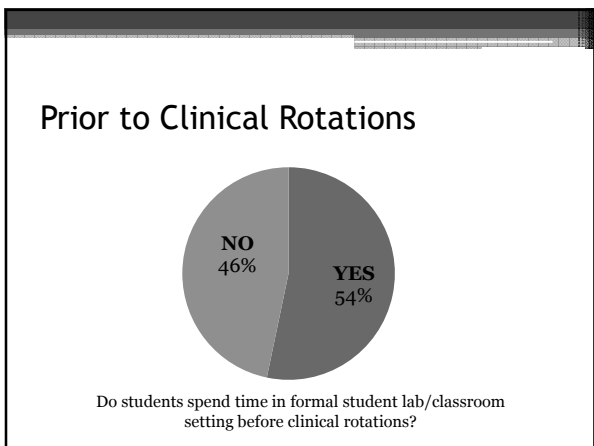
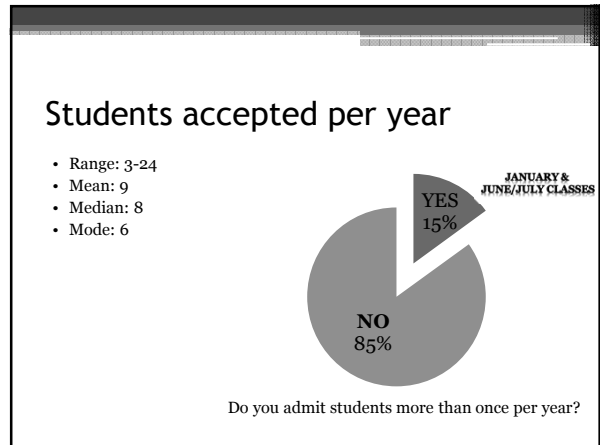
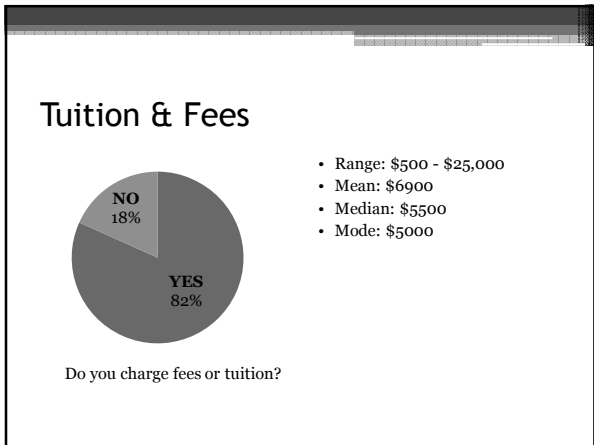
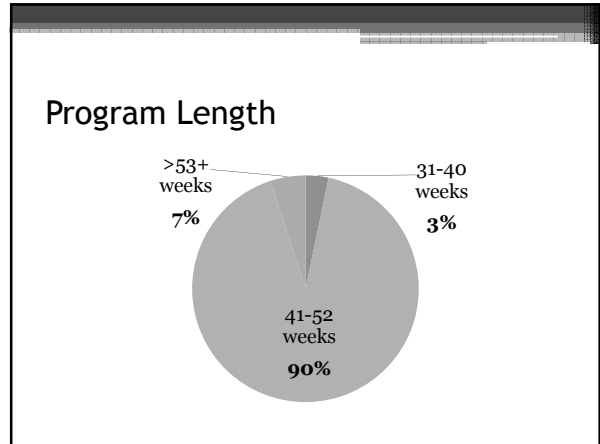
OUTCOMES

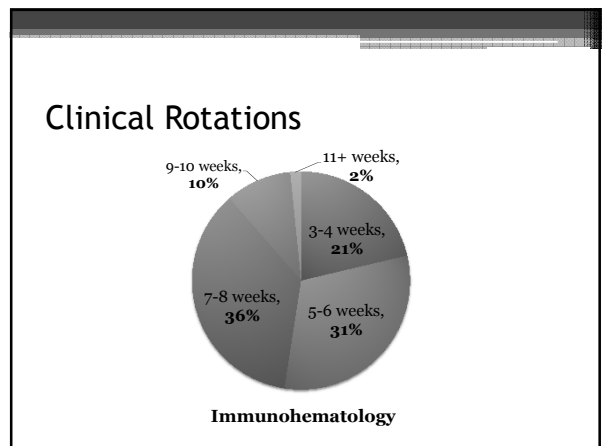
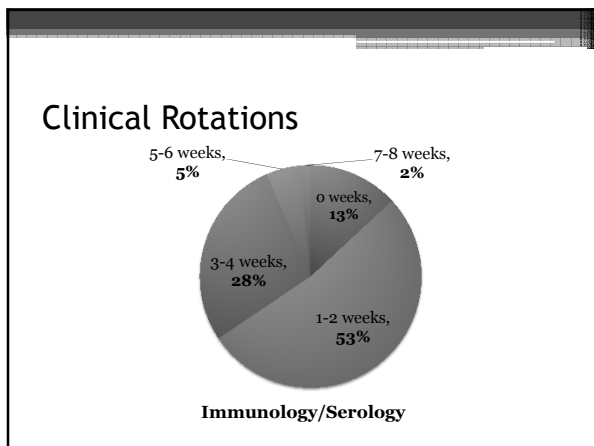
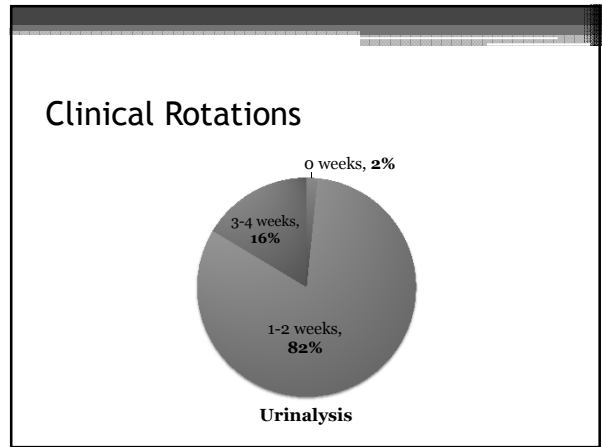
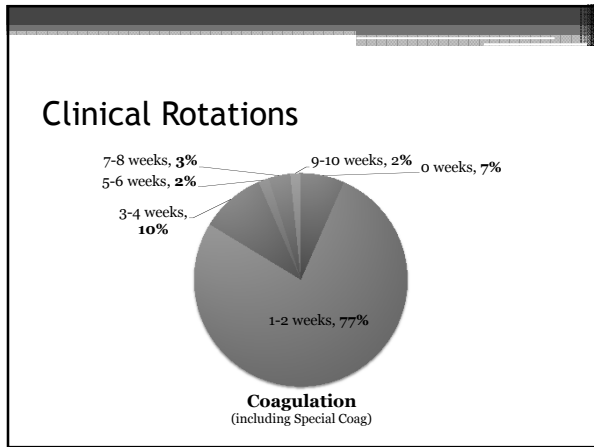
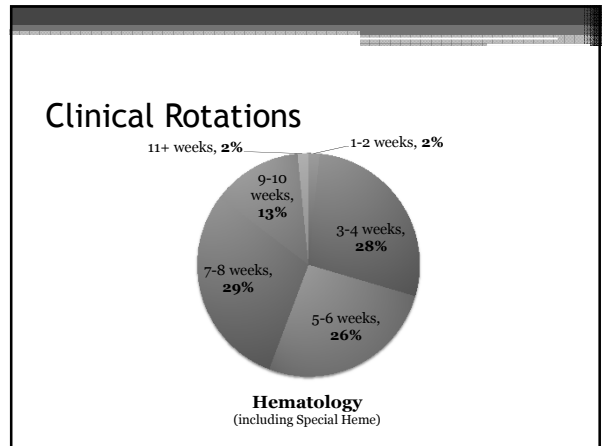
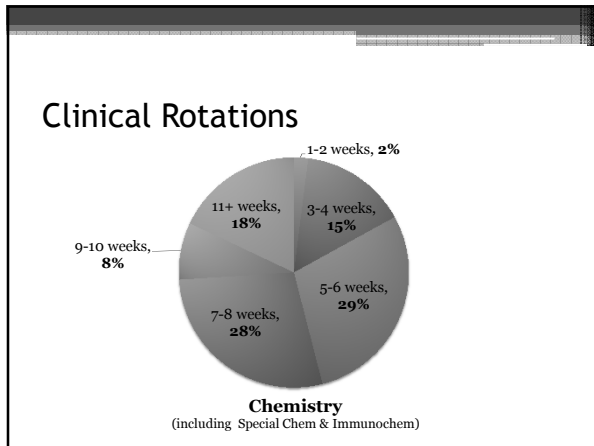
School Year (# of students)	Graduation Rate	Attrition Rate	Graduate Placement Rate	Certification Exam Pass Rate
2014-15 (5)	100%	0%	100%	100%
2015-16 (4)	100%	0%	100%	75%
2016-17 (5)	100%	0%	100%	100%
Rolling 3 year average	100%	0%	100%	93%
NAACLS benchmark	70%		70%	75%
Outcome Measure	Description		Source of Data	
Graduation Rate	for students who enter the final half of the program & complete the program		School attendance records	
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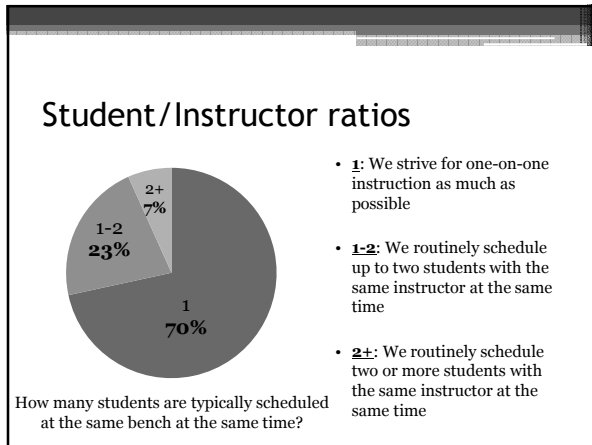
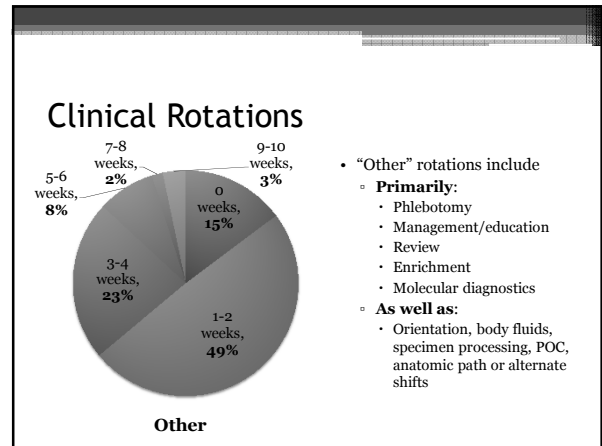
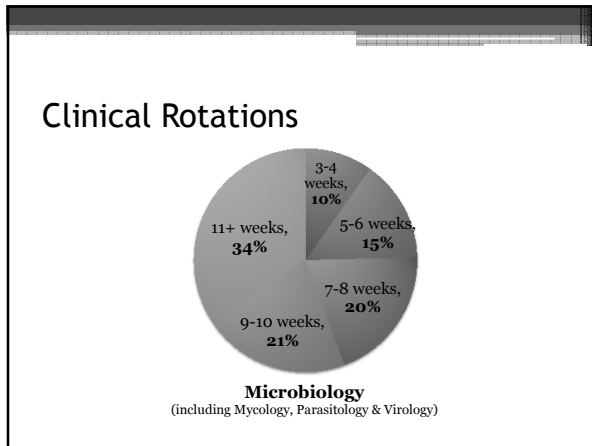
Survey data

- 40-item survey** sent to 100 Program Directors of hospital-based MLS programs
- 61% response rate**
- Main categories of data:**
 - Program Structure
 - Program Director & Instructor Job Duties and Responsibilities
 - Instruction Delivery
 - Other

PROGRAM STRUCTURE







Incorporating students in workflow

- **Trends:**
 - Combination of real-time testing & pulling samples after results are released
 - Departments where samples are most often pulled for student practice instead of real-time testing
 - Blood Bank, Microbiology & diffs in Hematology
 - Students test samples in real-time workflow, but are not allowed to verify test results



How Categorical Training is Delivered

- Most respondents stated:
 - Categorical students listen to the same discipline specific lectures with the MLS students and take exams
 - Categorical students complete the same discipline specific clinical rotation experiences required of MLS students
- Some respondents stated:
 - Students are usually not in the clinical rotation with the MLS students
 - Not trained during ‘off shifts’
 - Students also completed education & management courses
 - Some employ self-study packets or on-line lectures to teach

Program Structure Comments

- 3 weeks of primarily classroom, & remaining weeks are clinical mornings and afternoon classes; occasional all day clinical in lab
- Monday is lecture day, Tues-Fri. in rotations; students balance topics of their rotations with subjects taught on Monday (subjects do not always coincide)
- Once clinical rotations start, students spend 10 hours/week in lecture & 25 hours/week in clinical rotations
- We do a lot of manual testing in the student lab during the first 5.5 months

Program Structure Comments Cont'd

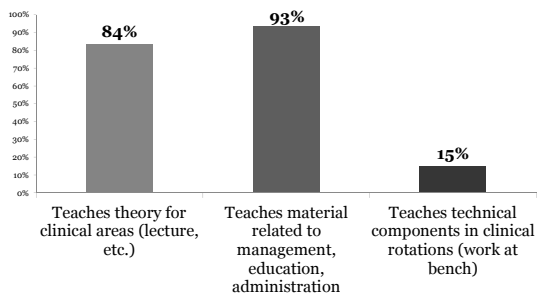
- Students attend formal lectures for entire clinical year & do not necessarily have lecture before starting a clinical rotation
- Students spend 40 hours a week in the lab; work side-by-side with techs; each day they attend 1 or 2 lectures
- In micro rotation, all students train together in integrated lab/lecture; once fundamentals are covered, students bench with instructors (1-1 or 2-1 ratio)
- We have 2 weeks of review at end of program (increase from the previous 1 week review)

Program Structure Comments Cont'd

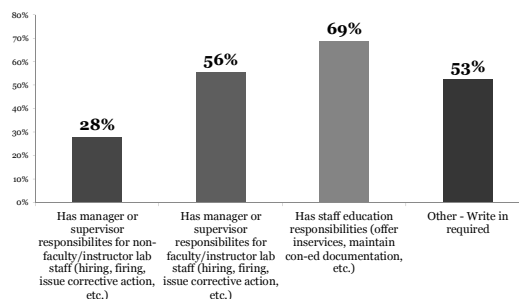
- We offer 75% Lab and 25% lecture
- Use hybrid (flipped classroom) sessions for most didactic lectures; students in clinical lab rotation 6 hours/day and in lecture 1-2 hours/day
- Considering implementing a student lab to increase size of program; also considering offering categorical training
- We are investigating an optional "track" for more intense molecular along with traditional disciplines; this could allow them to take the specialty exam after passing MLS (a growing demand in our area for entry level techs in this field/molecular)

PROGRAM DIRECTOR & INSTRUCTOR JOB DUTIES AND RESPONSIBILITIES

Program Director Job Duties



Program Director Job Duties Cont'd



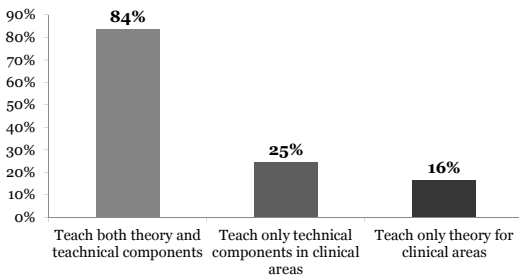
**Program Director Job Duties Cont'd:
"Other" Listed at 53%**

- Lab Director
- Lab Safety Officer
- POC
- Phlebotomist education
- Regulatory Compliance for System Labs
- System Lab Quality Coordinator
- Lab Scheduling

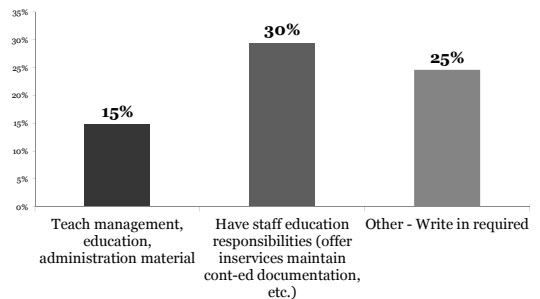
**Program Director Job Duties Cont'd:
"Other" Listed at 53%**

- Manage employees that perform new hire orientation, IT training
- Manage 2 lab departments & education programs
- Leader development program for lab staff
- Oversee competency program
- Recruitment Activities
 - Develop workshops for high school or college students
 - Organize lab tours and shadow experiences

Instructional Staff Job Duties



Instructional Staff Job Duties Cont'd

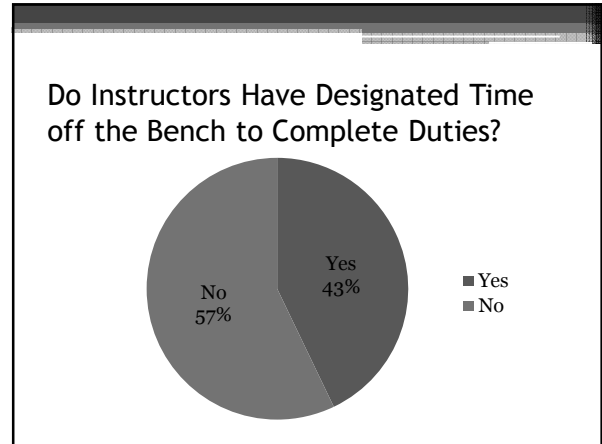
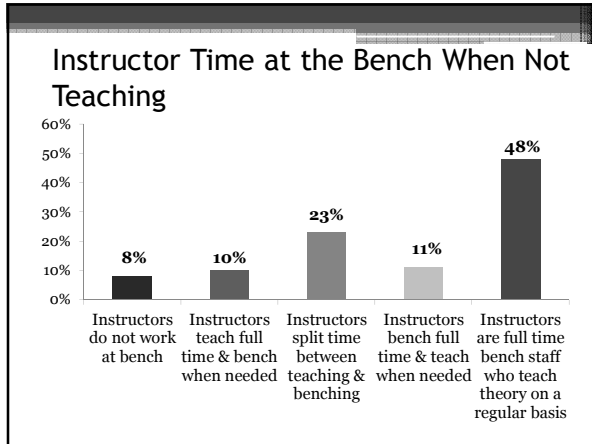


**Instructional Staff Job Duties Cont'd:
"Other" Listed at 25%**

- Lab staff teach technical components; pathologists, supervisors, & other PhD directors teach theory & some technical components
- One clinical instructor is chemistry lead
- Bench techs are "guest lecturers" and teach one class all year; micro supervisor teaches micro lectures; BB education coordinator teaches 50% of BB lectures
- Bench techs teach at least one theoretical lecture and serve as clinical trainer in rotations

**Instructional Staff Job Duties Cont'd:
"Other" Listed at 25%**

- Some have timecard (payroll) responsibilities; teach MLT and MLS students
- Coordinate new employee training, competency assessment, IT training, resident/fellow inservices
- Clinical training is shared by bench staff & lab director/PD; only director, pathologists, program educator perform the lectures



Instructor Designated Hours per Week off the Bench

- Range = 0.2 to 40 hours/week
- Mean = 12.8 hours/week
- Median = 16 hours/week
 - 1 answered: 0.2 hours
 - 4 answered: 1 – 2 hours
 - 8 answered: 8 hours
 - 6 answered: 12 – 20 hours
 - 2 answered: 26 – 30 hours
 - 2 answered: 32 – 40 hours

Additional Comments about PD, Instructor, Staff Responsibilities

- Clinical instructor time off the bench comments:
 - Clinical instructors ask for time off the bench to grade exams, update materials, etc., and the supervisors will grant their requests when staffing allows
 - Instructors usually get 1-2 days/month
 - Occasionally get time off the bench, but not on a regular basis
 - Staff are given almost no time off bench to prepare; most staff spend 15-20 hours on own time to prepare lecture material

Additional Comments about PD, Instructor, Staff Responsibilities Cont'd

- Clinical instructor's primary duties are benching, and they must squeeze in prep & teaching
- Primary instructor belongs to school 66% and to core lab 33%
- We have a FT Program Director (80% teaching & 20% admin) & a FT Program Coordinator (100% teaching)
- Faculty hours are maintained in school budget so we can designate that time as non-productive

Additional Comments about PD, Instructor, Staff Responsibilities Cont'd

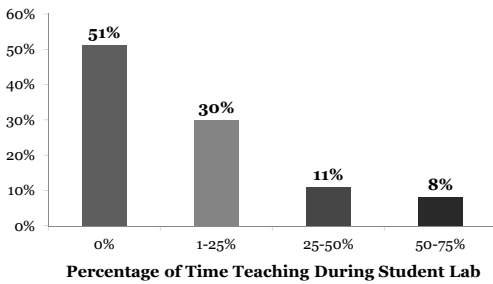
- Lean staffing taxes the ability of staff to meet productivity standards; our staff teach while working on the bench, and therefore are challenged to provide quality instruction
- Program Director (PD) does all of the didactic (theory) teaching; clinical instructors teach only at the bench
- MLS Program has 2 FTE; they provide majority of lectures; the instructor & bench techs teach clinical area

Additional Comments about PD, Instructor, Staff Responsibilities Cont'd

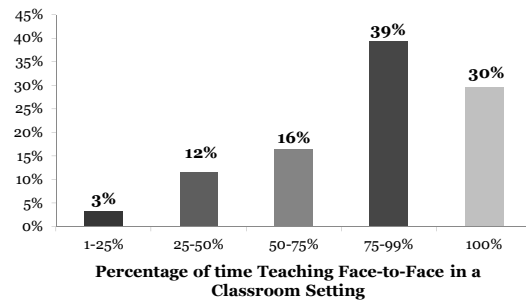
- Program Director (PD) does most of the lectures; lab director helps with clinical & lectures, and pathologists gives some lectures
- PD grades all exams & updates lectures; bench techs will review lecture material to ensure accuracy prior to lecture
- Lectures are presented by supervisors, managers, pathologists, PD, and instructor; bench techs do not lecture

INSTRUCTION DELIVERY

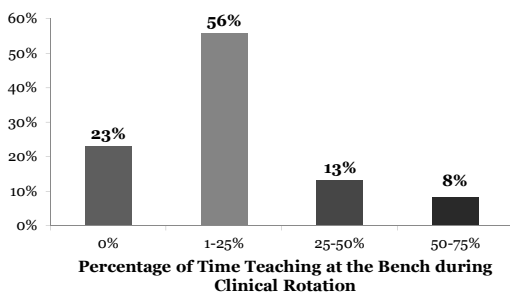
Didactic/Theory Instruction Delivery Methods



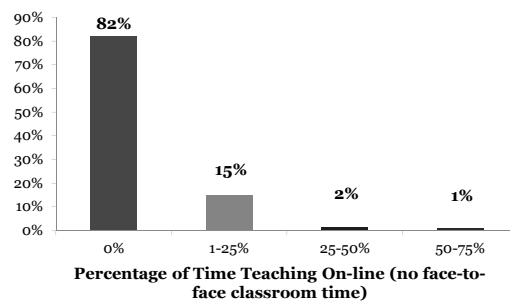
Didactic/Theory Instruction Delivery Methods Cont'd

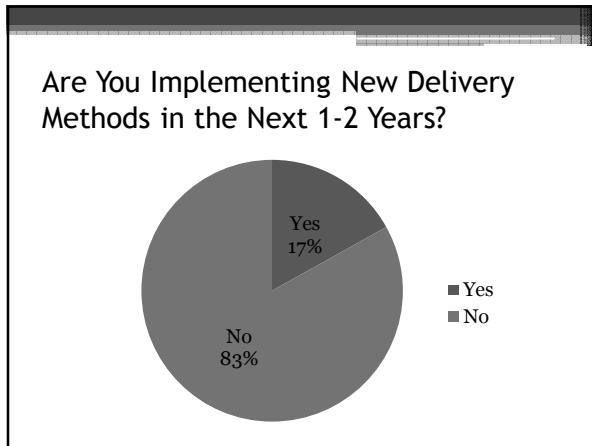


Didactic/Theory Instruction Delivery Methods Cont'd



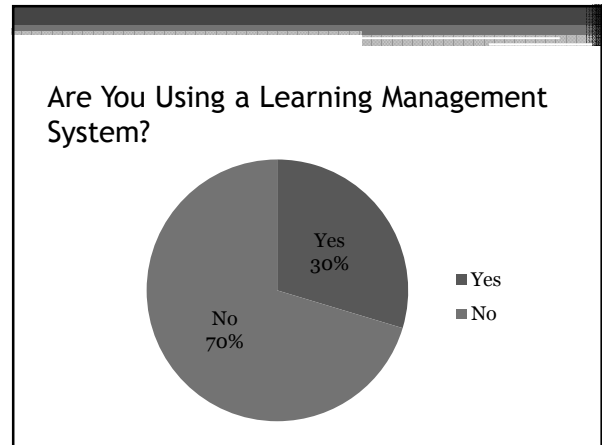
Instructor Didactic/Theory Delivery Methods



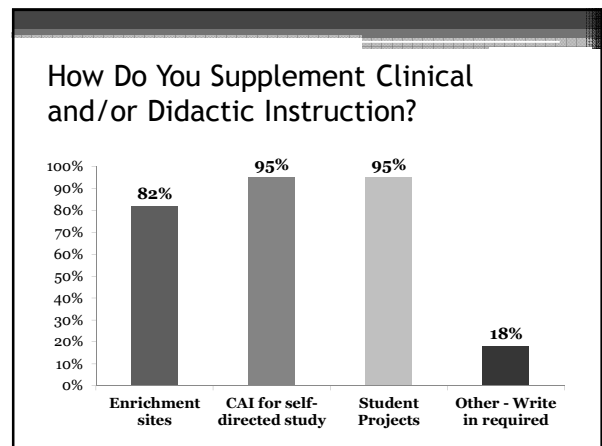


- ### How Do You Plan to Implement These Methods?
- Considering implementing student lab and cover certain teaching objectives prior to rotations; requires shortening some rotations
 - ITV (Instructional Television?)
 - Distance learning options to reach more students
 - On-line & flipped classrooms

- ### How Do You Plan to Implement These Methods (Cont'd)?
- On-line lectures
 - Live shared classrooms electronically sent; starting January 2018
 - For smaller courses (e.g. mycology)
 - Voice-over PowerPoint lectures, lecture capture, etc.
 - For education and management; post lectures and have students meet for discussion of topics



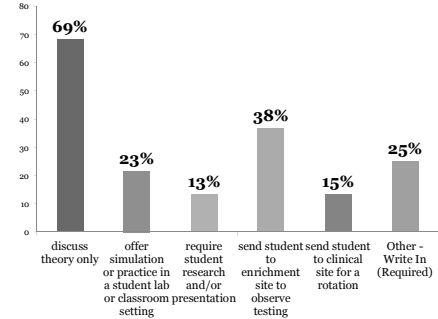
- ### Which LMS Do You Use?
- Canvas = 5
 - Edvance 360 = 3
 - MediaLab &/or MedTraining = 3
 - Blackboard Learn = 2
 - Totara = 1 (will soon switch away from Edvance 360)
 - D2L = 1
 - Hospital's LMS Media Lab = 1
 - Schoology = 1
 - Spark Learn = 1
 - eLMS for orientation exercises = 1



Other Supplemental Instruction

- State ASCLS conference
- Games
- Recorded lectures & flipped classroom approach
- Students present small scale workshop for H.S. students in a summer pre-med program
- Case studies
- Portfolio
- Self-study
- Unknown samples as an end-of-the-course challenge

Teaching Technologies/Methodologies Not Available On-site



Teaching New Methodologies versus Traditional Methods

- Have to teach both for BOC
- Teaching traditional methods in student lab but new technology in clinical rotation
- Teaching new technologies in lecture, on-line resources, videos and discussions
 - Adoption of new technology is slow due to budgetary constraints

Teaching New Methodologies versus Traditional Methods Cont'd

- Still need traditional methods to insure students can make sense of the automated results and growth characteristics
 - Instrumentation can fail, etc.
- Schedule students at an enrichment site for exposure
- Use of study questions to insure reinforcement of traditional methods in a clinical laboratory that is using newer technology

Teaching New Methodologies versus Traditional Methods Cont'd

- Students use rapid and traditional biochemicals for unknowns
- Perform all stool cultures by molecular methods now so do traditional cultures in student laboratory
- Blend of both in clinical rotations
- Would love to be able to access digital images of cultures for teaching students how to read cultures plates
 - Simulated cultures are difficult to create

Subjects Difficult to Teach

1. Flow cytometry
2. Molecular techniques
3. Tie for third place
 - Parasitology
 - ANA testing
 - Pattern reading
 - MALDI-TOF MS
 - Virology

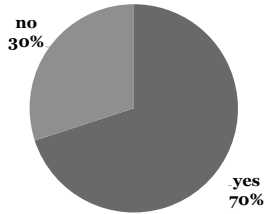
Subjects Difficult to Teach Cont'd

- Blood bank collection and donor processing
- Cytochemistry/Special Chemistry
- Bone marrow smears
- Electrophoresis

Subjects Difficult to Teach Cont'd

- Immunology/Serology
- Microbiology
 - Culture reading
 - Manual identification
 - Mycology
- Specialized Coagulation Testing

Formal BOC Examination Review



BOC Exam Review Structure/Format

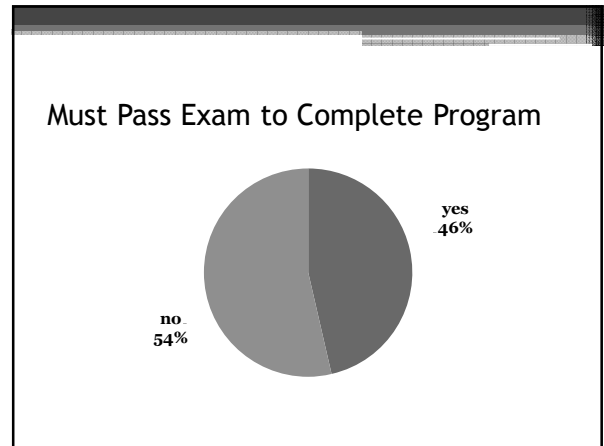
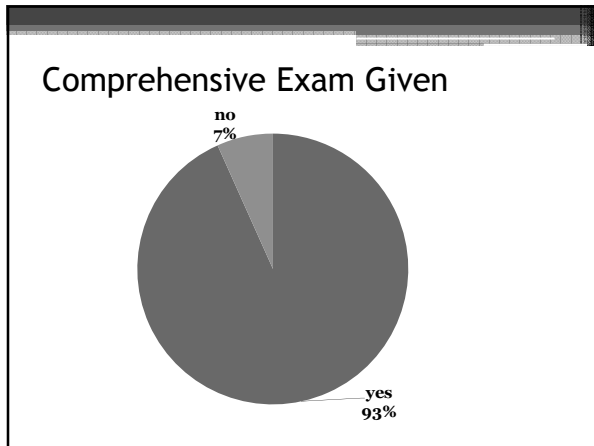
1. One week at end of program
 2. Over 3 weeks at end
 3. Over 2 weeks at end
- Others
 - Last month of program
 - Last 5 weeks in available lecture slots
 - Few hours to days over 7 to 8 weeks
 - One hour per week over several months

BOC Exam Review Structure/Format Cont'd

- Approaches
 - Practice exams
 - Paper and computer based
 - MediaLab exam simulator
 - Review course through Indiana Consortium (CIMLE)
 - Lab CE

BOC Exam Review Structure/Format Cont'd

- Approaches Cont'd
 - Comprehensive exam given three times during program
 - BOC practice exams
 - Provide BOC Study Guides
 - Independent study rather than formal review
 - Multiple practice exams during review weeks



- ### Instructional Delivery Comments
- Teach Mycology and Parasitology over two weeks prior to comprehensive reviews and exam
 - Require retake for the two weakest section of the comprehensive exam if the student does not pass
 - Students take a practice comprehensive exam and if they pass they do not have to take the “real” exam
 - Most do take both exams

- ### Instructional Delivery Comments Cont’d
- Share the classroom component with another accredited MLS program in the same city
 - MD, PhD and technical specialists very involved in teaching
 - Success this year with using narrated PowerPoints in a flipped classroom concept
 - Doing more with less
 - Student versus faculty game during review week

OTHER

- ### Pressures Experienced
- Shortages and retirements
 - 45% of applicants are unable to be placed for an internship
 - Pressure to admit more but can’t shorten the program (licensure)
 - Categorical training

Pressures Experienced Cont'd

- Pressure to have graduates fill vacancies in system
- Pressure to be a clinical site for a non-hospital based program
- Admit more "local" students for better retention

Pressures Experienced Cont'd

- Admit less students and shorten rotations
- Add more students to break even on budget
- Mechanism to offer MLT a pathway to MLS
- Admit more students by having more hospitals and reference labs as clinical sites

Pressures Experienced Cont'd

- Alternative rotations such as off shifts
- Admit more students or shorten the program
- Increase enrollment but no increase in budget

Time for Training New Graduate

Clinical Area	Weeks for Training (Mode)
Chemistry	2
Hematology	2
UA/Body Fluids	1
Immunology/Serology	<1
Blood Bank	>4
Microbiology	>4

Other Topics/Comments

- Use of a learning management system in a hospital setting
- Integration of categorical training with full-time student program
- Teaching full-time MLS students while serving as a clinical site for MLT students

Other Topics/Comments Cont'd

- Time management skill and study habits of on-line bachelor degree students
 - Fast paced, in person program with hands-on skills
- Incorporation of two classes in one year
- Increasing class size with limited staffing and resources

Other Topics/Comments Cont'd

- Hiring BS non-certified individuals to work as MLS
 - Pay rate?
 - Sitting for the categorical examinations
 - Fired if do not pass?
 - Will this eliminate the need for MLS programs?
- Alternative means to deliver instruction
 - On-line
 - How to lighten the lecture load

Other Topics/Comments Cont'd

- How to justify having the program
- Need sub-content areas of BOC again
- BOC exam needs to align with modern day laboratory practices
- Student laboratory session which can be done to enhance learning prior to clinical rotations

Other Topics/Comments Cont'd

- Help to improve teaching skills
- Issue of correlation of theory and patient testing with advances in automation
- Changes in curriculum could affect number of credits which university awards
 - May affect 3+1 students

Other Topics/Comments Cont'd

- Leaning the program down without making it harder on students
 - "Trim the fat"
- Program graduates do ramp up faster than external hires

Discussion/Questions

Contact Information:

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- Jennifer Knight
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We are all a little different but some things remain the same.

