

Clinical Laboratory Educators' Conference 2008 Abstracts

POSTER PRESENTATIONS

Presenters are listed in bold face type.

Assessing White Blood Cell Identification Skills Using Principles of Visual Cognition

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The purpose of this study was the development and testing of a novel method for assessment of white blood cell (WBC) identification skills used in the field of clinical laboratory sciences (CLS). A dual format exam was administered to both novices (students) and experts (laboratory professionals). Format 1 was similar to current assessment formats, simply presenting a series of single WBC images for identification. Format 2 applied principles of visual cognition, grouping WBCs for identification by patient and presenting multiple example images from the patient before requesting identification of individual cells. This novel exam format was intended to: (a) provide a contextualized visual background for single cell identifications, (b) mirror the process of WBC identification used in clinical practice, and (c) promote improved performance on difficult/atypical WBC identifications. Statistical analyses did suggest that expert performance levels were significantly improved by the novel exam presentation format. Novice performance, however, was not significantly altered by exam format. Overall results indicated that the novel exam format invoked experts to implement similarity-based processing, allowing some identifications to be made at the level of the patient case, rather than simply at the feature identification level. Implications of this study include possible alterations to current certification/ proficiency exam formats for questions requiring the visual identification of white blood cells. This study also suggests that using patient image sets as instructional stimuli may encourage the development of advanced cognitive processing skills in students.

Comparison of Registry Scores between an Online and On-campus Clinical Laboratory Sciences Degree Program

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In recent years online courses have been increasing in availability to meet the needs of students unable to attend college in a more traditional setting. Another topical development has been the ability to earn a degree granted entirely through online delivery

at both the MLT/CLT and MT/CLS level. Lingering doubts have been expressed with regard to the quality of online instruction as compared to the more conventional classroom method as it relates specifically to overall student performance, especially in a scientific curriculum. Since the number of graduates from a completely online delivery system has thus far been limited, the question has not been thoroughly deliberated. This study examined the performance outcome of an online-delivered degree versus the traditional classroom and is comprised of 73 online and 213 on-campus graduates in clinical laboratory sciences from WSU during the years 2002 to 2007 at both the MLT/CLT and MT/CLS level. Outcomes were assessed by comparing categorical and total test scores, in addition to first time pass rates on the ASCP Board of Registry Exam. The two groups (campus vs. online) remained statistically indistinguishable in the majority of categories when analyzed with an unpaired t-test at $2p=0.05$. Surprisingly, those categories demonstrating statistical differences displayed divergence in both directions. Categories that exhibited a statistical difference were scrutinized for possible explanations, as well as feasible solutions to improve curriculum and narrow disparity.

Coping with Additional Upper Division Requirements: A Case Study

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Core professional courses, service learning, diversity, and collaboration are some initiatives emphasized at universities today to ensure that the graduates have knowledge and skills that will help them as persons, professionals, and citizens. Clinical laboratory science (CLS) programs, however, have little space in the curriculum to add new courses or activities. This qualitative case study examines how a CLS program dealt with the mandate to add upper division general education requirements to the curriculum. With the vision of becoming a top five public liberal arts university, a new general education curriculum was implemented at the University of Illinois at Springfield which required the addition of new upper division courses. Questions which guided the research were: "What strategies are used" and "What barriers exist" when dealing with such a curricular challenge. Ongoing and simultaneous data collections and analysis were performed using interviews and artifacts such as emails, web postings, and minutes. Analysis and categorization of the data revealed the importance of communication and compromise between the

administration, the curriculum committee, and the CLS program. These compromises were accomplished by such strategies as visits with the administrator very early in the process, meeting with the science representative to the curriculum committee, and adding content suggested by the most resistant members of the committee. Examples of revisions to the CLS curriculum are conversion of the education/management course to a general education course, and addition of “engagement” competencies, and daily reflective journals to the clinical rotation courses.

Designing a 21st Century Molecular Pathology Degree Program

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Since the inception of the Texas Tech Health Sciences Center graduate program in molecular pathology in 2003, the development of the curriculum has been a fluid and dynamic process to meet the demands of this developing profession. The curriculum is assessed annually by the following methods: advisory committee, input from faculty retreat, feedback from clinical preceptorship sites, surveys from employers, survey from graduates, and outcome measures. The evaluation process over the past four years has led to the development of a curriculum that has moved from a research emphasis to a practice management emphasis. The clinical research component has been redefined to comprehensively address start-up testing and assay validation. In addition, a course has been developed that specifically concentrates on the unique challenges of the operational issues involved with accreditation, personnel development, and external communication with clinicians. A human genetics course was added in place of an introductory molecular diagnostics course, which has deepened the level of graduate study. A redeveloped statistics course now includes relevant human genetic statistics and finally, adding a cell biology course has acted as leveler to the diverse student enrollment. Currently, we are working to integrate the courses to provide the students a more congruent experience. The design of the curriculum for the 21st century molecular pathology degree program must include components that prepare graduates for the demands of start up testing and assay validation as well as unique management issues related to the diagnostic molecular laboratory.

The Effects of Peer Tutoring on Outcomes Measures

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Success among first year clinical laboratory science (FYCLS) students in a 2+2 program can be compromised due to transitioning from a traditional academic campus to a professional program. Peer tutoring was initiated to assist FYCLS students

in developing study skills that support comprehensive learning and acclimation into a professional program. Peer tutoring was developed by recruiting second year CLS (SYCLS) students who had demonstrated strong study habits and professional conduct. Initially a group review was offered for the FYCLS prior to the first exam. Afterwards, those who scored below 75% in any of the subjects were encouraged to seek individual tutoring with a SYCLS. Periodic group reviews were conducted for all students regardless of performance on weekly exams. Exam scores were monitored on a spreadsheet to determine the impact of tutoring on performance and a survey was completed by FYCLS and SYCLS addressing expectations of the tutoring. Of the FYCLS, 67% participated in the first group review session and 33% in individual tutoring. Thirty percent of the individuals who consistently utilized individual tutoring experienced an increase in exam scores (12 points). One hundred percent of the FYCLS would recommend utilizing the resources of the tutoring initiative to fellow classmates. Amongst the SYCLS, all stated that tutoring was an opportunity for review of first year material in preparation for the national certification exam.

Emergency Preparedness Instruction: Use of a Global Bioterror Scenario in a CLS Curriculum

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The public health community recognizes the importance of preparing allied health professionals for response to emergencies. The Center for Public Health Preparedness has developed core competencies for laboratory professionals, including the application of “creative problem-solving and flexible thinking”. Emergency-preparedness education is a suitable topic for the application of problem-based learning, which encourages creativity and flexibility in the context of a situation. *Atlantic Storm* is a global bioterror scenario developed by the Center for Biosecurity (University of Pittsburgh Medical Center) involving an intentional multi-national smallpox attack, originally executed as a cabinet-level tabletop exercise in January of 2005. The *Atlantic Storm* scenario was incorporated into a CLS seminar class, which was designed to address, among other outcomes, current topics of professional interest. Students were assigned roles as political and institutional leaders during the scenario, over four one-hour class periods. Interdisciplinary issues covered during the scenario included international approaches to civil liberties during a crisis, the structure of existing international organizations, and appropriate roles for these entities in response to a bioterror incident. Public health concerns, national response to disease, distribution of resources, and outcomes of actions taken were discussed. Students were also asked to compare events of the scenario with other possibilities such as pandemic influenza. Student evaluations were favorable and indicated that,

after the exercise, there was an increased recognition of the need for emergency planning, not only on an institutional basis but also nationally and internationally.

Integrating Cultural Competence Awareness into Allied Health Education

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The faculty in three allied health educational programs – Advanced Medical Imaging Technology, Clinical Laboratory Science, and Genetic Counseling – developed a project with the goal of enhancing cultural competence amongst campus and distance learning students and core, adjunct, and clinical faculty. The CLS Program's ultimate goals included developing cultural competence training units that could be delivered to campus and distance learning students and developing training materials that would assist the program's various faculty groups in serving a diverse student population. Following a series of faculty training sessions with cultural competence experts, the core faculty in the programs drafted discipline-specific cultural competence curricular maps to identify curricular units that contained cultural competence elements. The curricular maps and concomitant learning activities were evaluated against benchmark practices that were described by the consultants. The CLS curricular review showed that the existing cultural diversity units in our capstone courses included the required fundamental training elements and that key cultural competence elements were appropriately included in existing courses. However, because our goal was to develop innovative and enriching means by which to address cultural competence, additional course activities were developed. Examples of those learning activities include an interactive self-assessment tool that also serves to foster critical thinking, a simulation style assignment that addresses the numerous aspects of cultural diversity, and the inclusion of an enhanced unit that addressed the socioeconomic factors of infectious diseases. Additionally, to increase cultural competence awareness, a portfolio of materials was developed and utilized as a required faculty training tool.

Medical Decision Making and Critical Pathways in Laboratory Science Education

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Critical or clinical pathways generally involve diagnostic algorithms as a mechanism to improve patient care. Recent updates

to NAACLS accreditation standards for clinical laboratory science (CLS) curriculum includes instruction in both critical pathways and medical decision making. To address this need, during a senior Medical Laboratory Science (MLS) clinical chemistry course, each student was assigned four unique but interrelated clinical case studies, the data for which they derived from “mock” patient samples used during their assigned laboratory sessions. At the end of their lecture series, including guest speakers from other related healthcare professions, half of the class was asked to identify the primary diagnosis for each of their cases and provide an algorithm showing the interrelationship between the diagnosis and any anticipated laboratory data outcomes. This activity was followed by written case study reports justifying how their experimental laboratory data supported their proposed patient diagnosis for each case. The remaining half of the class simply submitted the written case study reports for each case. The case study reports for both groups were graded based on a predetermined rubric. Results showed that the group that initially generated an algorithm had report grades that were 22% higher. Instructors also noted that those students in the algorithm group were more likely to request additional instructor help and feedback and to ask more in-depth questions during algorithm development.

Professionalism: Making the Grade

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A crucial demand for highly qualified healthcare practitioners exists, mostly in the areas of technical, professional, and operational improvements. In response, the University of Massachusetts Dartmouth Department of Medical Laboratory Science seeks to better prepare students for a career in the clinical laboratory by actively engaging students in the development of professional competency along with technical skills. Skills such as attention to detail, approachability, attitude, and attendance have been incorporated into the curriculum in an effort to meet the demands of future employers. Teaching strategies make use of well-designed course objectives and specific, measurable learning outcomes based on a survey of professional attributes. Data was collected from fifty New England area hospitals and more than one hundred MLS college students. The instrument requested the responder to rank, by importance, ten pre-selected qualities of a laboratory professional. Survey results indicate that although employers and students rank knowledge in the field and attention to detail as “most important”, discrepancies exist in the importance of the following skills: adaptability, approachability, attitude, and attire. Instructional strategies focusing on narrowing the gap between the workplace and students will be reviewed. Such strategies include introducing first year students to professional organizations and requiring

them to research the profession and present the findings. Senior MLS students adhere to a dress code, work in teams until the daily workload has been achieved, and participate in external professional activities. The goal is to develop these necessary skills and provide students with multiple venues to practice and apply them prior to entering the workforce.

Student Performance Outcomes on Molecular Diagnostics Laboratory Modules Incorporated into CLS Program Senior Clinical Chemistry Course

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As new molecular assays are being developed in basic research laboratories and the Food and Drug Administration (FDA) approves more tests for diagnostic applications in clinical laboratories, a new CLS discipline is being established: molecular diagnostics. The current NAACLS accreditation standards require that the CLS educational programs incorporate molecular diagnostics into the curriculum "including performance of assays". Molecular diagnostic course content was added to our CLS program in fall 2005. Student laboratories consisted of online virtual laboratories of PCR (polymerase chain reaction) and DNA fingerprinting of subjects of kinship and crime investigations. In fall 2006 and 2007, students began performing PCR and DNA electrophoresis as part of their student laboratory experience. We evaluated student learning by written examination of lecture and laboratory content. We found a statistically significant difference between the groups' examination performance that had a "hands-on" experience and the one that had a virtual experience only. Additionally, we found that the statistical analysis of the upper 25th percentile of students showed no significant difference in the student performance when either virtual or hands-on laboratories were used. There was no statistically significant difference in the performance of students in the lowest 25th percentile either. The data suggests that the hands-on laboratory experience has no effect on the highest performing students or the lowest performing students. However, since there was a statistically significant difference in student performance for the whole group, the data suggests that hands-on experiential laboratories have the greatest effect on students who perform in the middle percentiles.

Surveys of Support for the Doctorate in Clinical Laboratory Science

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Two recent surveys of clinical laboratory professionals shed light on the interest in and support for the Doctorate in Clinical Laboratory Science (DCLS). One survey conducted by Beck and Doig in 2005 inquired about the career preparedness and plans of early career professionals. A randomly selected sample of 972 laboratory practitioners with one to three years of experience was asked about their interest in pursuing the DCLS. Of the 299 respondents, 65% expressed interest in following this career path. Another 28% thought it would be good option instead of pursuing a medical or physician assistant career. In open ended questions, 35% of respondents were enthusiastic, with some eager for more information. A second survey with implications for the DCLS was conducted in 2007 by an inter-agency task force charged to rethink the levels of practice in CLS. A non-random sample of over 2500 laboratory professionals responded to questions about a proposed model which included the DCLS level of practice. Only 7.5 % of respondents thought that laboratory professionals would not be good at consultation. Over one-third (36.5%) thought that hospitals would not hire a DCLS. Responses to these questions differed based on the respondents' employment. For both questions, pathologists appeared to be more supportive of the DCLS than some other laboratory groups. These two surveys demonstrate substantial interest in the DCLS from early career laboratory professionals and support for this career path from laboratory professionals.

TECHNOLOGY DEMONSTRATIONS

Educating the Educator: Teaching Students How to Teach

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Constant changes in providing healthcare, budgetary constraints, and the shortage of clinical laboratory personnel have all greatly impacted the employment opportunities and job descriptions of clinical laboratory scientists. Baccalaureate degree laboratorians are replacing bench work with more administrative roles and responsibilities. One such responsibility is that of an educator. Recently hired personnel require quality training. Residents and interns in hospitals and clinics need information on newly developed laboratory tests; and our veteran colleagues are required to complete certain continuing education credits by attending in-service refreshers, workshops, and presentations. The objective of this technology demonstration is to provide a design for quality teaching methodologies included in a senior capstone course for a clinical laboratory sciences (CLS) BS de-

gree programs. The new technologists need to be able to teach others; therefore the capstone project was developed giving students an opportunity to learn how to teach and to develop teaching materials. The design includes projects analyzing needs, target populations, tasks, objectives, and current training and resources. In addition, implementation plans, course design documents and evaluation plans will be demonstrated.

Examples of teaching projects on PowerPoint presentations developed by senior CLS students both from online and on campus, will also be demonstrated. These projects have been presented to laboratory personnel, interns, and residents in various hospitals and clinics. The presentations have been a great avenue to introduce the students early on to the entire healthcare team and review the role and the value of clinical laboratory scientists in providing quality healthcare.

Let's See That One More Time!

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The clinical laboratory science (CLS) curriculum continues to expand and educators struggle to fit basic and new concepts into limited course time. Complex topics such as antibody panel 'cross-off', identification of fungal agents, and the coagulation cascade, that normally would have been taught in extended lecture times are compressed. While students struggle to master these concepts in shortened classroom presentations, some clinical affiliates take students for less time in practicums or have ceased to perform certain types of testing. This, in turn, reduces time for application or reinforcement of the concepts. Interactive learning modules requiring input by students and providing them with direct feedback are a good adjunct to traditional lecture presentations and provide an opportunity for repetition until the concept is learned. While faculty have the content expertise, few have time or expertise to develop these modules. CLS faculty at the University of Texas Health Science Center hired a high school student with exceptional computer skills in several different program applications to help develop learning modules that could be incorporated into lecture or

provided to students via computer access. Faculty provided the creative concepts and flow while the student incorporated these into computer format. These practice or reinforcement modules use a variety of interactive methods including immediate feedback to student responses. This technology demonstration will include several completed modules including one for the coagulation cascade, one for antibody panel workups, and a fungal identification module under development.

National Tuberculosis Curriculum Consortium Technology Products

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Tuberculosis (TB) is currently on the decline in the US, however, it is imperative that all medical disciplines remain alert to the detection, identification, and treatment of this deadly disease. Therefore, the National Tuberculosis Curriculum Consortium (NTCC) was established in October 2003 under a contract from the National Heart, Lung and Blood Institute of the National Institutes of Health (N01-HR-36157). One mission of the NTCC is to create access to educational and training opportunities for CLS/CLT students. This technology demonstration will highlight curricular products created by the NTCC for TB education in CLS/CLT programs. A sampling of all completed or preliminary work products will be demonstrated including test questions, competencies, computer-based learning objects, PowerPoint presentations, and computerized case studies. These educational products are available to all CLS/CLT programs at no cost through the NTCC website (<http://ntcc.ucsd.edu/>) as they are developed. Although TB testing may be sent to reference laboratories, it remains important content for clinical laboratory students. The NTCC technology products can supplement and or update current TB teaching materials. By developing active learning modules to enhance current TB curriculum for CLS/CLT students, it is the hope that TB infection rates will remain low in the US.