Clinical Laboratory Educators' Conference 2013 Abstracts

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Poster Presentations

Audience Response Devices (ARD) Application to Three MLS Clinical Chemistry Courses: How Do MLS Students Feel?

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Utilization of Audience Response Devices (ARDs) in MLS Clinical Chemistry courses has been increasing without measurable evidence to support the application of these devices to the lecture/classroom. The purpose of this study was to collect student perceptions (before and after) of an ARD device (Turning Point clickers) applied to certain sections of a clinical chemistry lecture course. Three institutions participated in this study, two of which had never used these devices while one was currently using them. Student volunteers were asked to take a pre- and post-exposure survey about their learning experiences and use of ARDs during their academic careers. In addition, volunteers were asked to take nine-question "exams" over the course material that they learned using lecture and an ARD. Qualtrics, an on-line survey program, was used to administer the surveys and the "exam" questions. All the clinical chemistry lectures used in this study were given by the same instructor (PI). Total volunteers for this study from three locations came to 19 for the pre-exposure survey and 15 for the post-exposure one. The pre-exposure survey found that students preferred lectures and case studies as teaching tools. Post-exposure surveys showed that 100% of the volunteers found the use of this active learning device "comprehensive" and 73% found it "comprehensive and engaging". Evidence from this study indicates a favorable inclination by the students toward the use of ARDs as teaching tools. However, 53% of the students suggested using the clickers in conjunction with other teaching methods for MLS courses.

Be Part of the Clinical Team: Emphasizing Interprofessional Communication with Blood Bank Students

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Effective teamwork is necessary for optimal delivery of healthcare. With clinicians dependent on rapid turn-around times for blood components, it is essential the medical laboratory scientists (MLS) in the transfusion service communicate delays due to discrepancies, antibodies or difficulty procuring blood components. In order to emphasize the necessity of interprofessional (IP) communication to MLS students, we utilize an activity called transfusion medicine rounds. Initially, students are provided with a brief patient history and the results of the type, screen, and antibody identification. The student evaluates the case and provides two reviews: one technical and one clinical. The student must clearly define: 1) important information to discuss with a MLS, and 2) that which is key to a discussion with a clinician. The student presents the technical review to a panel of MLS. For the clinical review, the student discusses the case with a member of the clinical team (nurse or physician's assistant arranged by the instructor prior to the exercise). The clinical participants are encouraged to ask any questions they would routinely ask in practice. A survey of students (n=16) revealed that 100% strongly agree the activity emphasized the importance of IP communication and helped them understand what blood bank information is important to clinicians. Likewise, 81% strongly agree and 19% agree they are more confident in their IP communication skills after

participating in the activity. Having two distinct conversations enables the students to distinguish between information important to a laboratorian versus that which is important to a clinician.

Blended Learning Model Provides a Link Between Distance-Learning and Laboratory Instruction

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The demand for laboratory professionals continues to exceed supply. As a result, academic institutions preparing the future workforce need to design pathways that are more accessible for students. Traditional MLS programs develop student psychomotor skills weekly in a laboratory setting. To minimize student travel, instructors developed a blended learning model combining online teaching with traditional laboratory instruction. This innovative approach to laboratory education required distance-learning students to complete a weekly virtual lab in preparation for two rigorous on-campus laboratory sessions.

Virtual laboratories were developed for distance-learning students to reflect the laboratory principles taught weekly to on-campus students. Methods: A two-year study was completed in which students' perceptions were evaluated using an ordinal-scale designed questionnaire. Twenty-six survey questionnaires were distributed with a 100% response rate. Using SPSS version 18.0, frequencies and descriptives were generated. A majority of respondents indicated the virtual laboratories reinforced the laboratory concepts. However, students preferred hands-on learning to virtual laboratories. Respondents also indicated additional communication was needed with instructors when completing the virtual laboratory assignments. After three years of delivering the distance option, the overall program enrollment has increased and students completing the program have stayed in their local communities helping provide laboratory professionals in areas of the state considered underserved.

Changing to a Clinical Experience Model

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In 2009-2010 our CLS program began a systematic review of the curriculum and assessment of the essential content for the clinical training component of our curriculum. The University-based curriculum provided extensive hands-on experience in our campus laboratories, but we lacked the ability to recreate the real hospital environment. Students didn't need technique training at the bench as much as they needed to experience the clinical setting, multi-tasking, heavier workloads, and the integration of laboratory work. Due to this change in purpose, we realized that we no longer needed the large full-service laboratory for the traditional clinical internship training. Instead we could add a number of alternate locations for a clinical experience including commercial, reference, public health, out-patient clinics, and small rural hospital laboratories. This greatly increased the potential clinical sites for students. The curriculum focus on a clinical experience rather than a clinical training, allowed for a decrease in the total number of weeks in the clinical rotations from 22 to 12. Over the past 3 years we have implemented this new model for clinical training and expanded our clinical sites to 58 throughout the state. Students are sent to at least one traditional and one alternate site for the four primary CLS disciplines. Student outcomes have continued to meet the program metrics including certification scores, employment rates and employer satisfaction.

A Comparison of On-Campus and Distance-Learning Student Exam Scores

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To remain dynamic and viable, academic institutions preparing the future MLS workforce need to design more accessible pathways for students therefore, the medical laboratory program personnel at UAMS develop a distance option for completing a Bachelor's degree in Medical Laboratory Science. Virtual laboratories across all disciplines were developed that reflect the laboratory principles taught weekly to on-campus students. Compare outcome measures that include practical exam scores, final course averages, and BOC scores for students completing the distance learning track and students completing the on-campus

track. The two-group post-test-only experiment design was used for this study. The two groups were compared on multiple measures, and the Student's T-test was used to assess whether the means of the two groups were statistically different from each other. The alpha level of .05 was set a-priori and SPSS v.19 was used for all data storage and analysis. Descriptive data and frequencies were generated. There was no statistical difference between the distance students and on-campus students' performance on the comprehensive final. However, distance students scored slightly higher on hematology, microbiology and body fluids laboratory practical exams. In addition, distance student pass rate on the BOC is 93% as compared to on-campus student pass rate of 86%. The primary outcome of interest was whether the two groups were different after the distance education intervention was delivered. Using a blended learning approach MLS Faculty can successfully combine online and traditional laboratory instruction to accomplish quality student learning outcomes.

Enhancing the Simulated Laboratory Experience with a Commercial Laboratory Information System

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Students at Ferris State University are required to enroll in a simulated laboratory course during the semester prior to their clinical experience. Through grant funds, a laboratory information system was purchased and installed on seven laboratory computers and interfaced to several instruments. Students order, review and result tests on a variety of patient samples ordered with the daily workload. This system provides a realistic simulation, however, during the initial use of the system a problem was noted when faculty observed that students would wait until the end of their lab period to enter all of their daily work results, often leading to a 2-3 hour gap between testing and data entry. This was determined to be inefficient and an unrealistic practice. Through faculty discussions, it was determined the problem would be alleviated and student performance would be enhanced with the ability for remote data entry from the student benchtop. An additional $5200 grant was awarded by the Ferris Foundation, and four laptop computers were acquired to enhance the simulated experience at the bench. Students are now able to directly enter data for manual testing, such as differentials and experience paperless microbiology reporting. This has led to greater efficiency in the simulated laboratory testing and resulting process, and also better prepares students for the experience of more streamlined testing and resulting of samples during their clinical experience.

Evaluating the Effectiveness of a 3D Virtual Learning Environment in Clinical Laboratory Science Education

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Educational technology allows education to be virtual and accessible around the clock anywhere an internet connection is available. In an effort to make education more accessible to Clinical Laboratory Science (CLS) students, meet the demands of increased costs of medical laboratory education, and address the shortage of clinical preceptorship sites there is a need for the development of alternative teaching methods for teaching medical laboratory skills. Virtual learning environments (VLEs), such as Second Life (SL), offer the capability of creating virtual classrooms accessible via the internet and requiring no additional physical teaching space. VLEs are highly customizable and offer many educational tools to both the educator and student. The objective of this study was to evaluate the effectiveness of a 3D virtual medical laboratory simulation and examine students' perception of a virtual medical laboratory learning environment in Second Life. CLS students from 2010 and 2011 CLLS 3200 Basic Methods and Introduction to Laboratory Operations cohorts participated in this study. ANOVA statistics were used to determine if there was a significant difference in learning gains between SL and non-SL groups. Results revealed no significant learning gains between the two groups. Both SL and non-SL groups did experience significant learning gains using both methods of instruction. In addition, Pearson's correlation test revealed a weak negative correlation between the software's ease of use and overall satisfaction.

Implementing Gel Technology in the Student Laboratory Setting

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The University of Nebraska Medical Center Clinical Laboratory Science Program employs a 3+1 format. This format includes an 11-week student laboratory completed at the academic institution, followed by a nine-month clinical component completed at one of 18 clinical affiliate sites. Regular survey responses are monitored for opportunities/deficits in clinical education. A deficit was identified in the exposure of students to gel technology during the clinical blood bank rotation. Of the 16 sites responding to the survey, 100% indicated the use of non-tube methods as the primary means of antibody detection and identification. While 63% of sites indicated the use of gel technology, due to student distribution, 50% of 57 total students received no exposure to gel technology during the clinical year. To rectify this deficit, manual gel station technology was implemented during the 11-week student laboratory, complementing the tube and solid-phase testing already employed. As a result, 100% of students completing clinical training through UNMC and five partner universities across the Midwest have received clinical education in tube, solid-phase, and gel technologies in the blood bank. Outcome measures include increased preparation for the nine-month clinical rotation, increased exposure to multiple technologies in blood bank, and a higher satisfaction rate of clinical instructors at affiliate sites. While it can be difficult to implement advanced or new technologies in a student laboratory setting, implementing manual gel technology was neither cost prohibitive nor difficult. Education in multiple current technologies better prepares students to be excellent entry-level clinical laboratory scientists.

Improving Student Writing Skills through Online Instruction

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There is an increasing expectation to produce medical laboratory science (MLS) students who are capable of expressing themselves through professional writing. The task is even more challenging when the entire MLS program is online. It has been our experience in the Northeastern State University (NSU) MLS program that many MLS students resort to "cutting and pasting" instead of writing in their own words. The purpose of this study was to address different methods of instruction in order to teach MLS students techniques for writing clearly, professionally, and with academic integrity. Medical Laboratory Science online courses at NSU utilize the Blackboard Learning System. Traditional essays and research papers were assigned in each course in order to encourage the students to write in their own words and without plagiarism. Website links such as http://www.apastyle.org/ or http://cbc.arizona.edu/sites/default/files/marc/Sci-Writing.pdf were provided to students as resources for writing instructions. Topics of discussion, like the use of specific research experiments, were posted to the Blackboard Learning System Discussion Board to facilitate the students' practice of addressing issues with words. Furthermore, students created PowerPoints assignments over individual topics to help facilitate classroom learning. The students' writing improved in flow and content as the semester progressed. Improvement in student's writing was measured using a departmental rubric and class assignment averages were compared using an one-way ANOVA analysis. These various writing assignments helped students gain the writing confidence they need in order to write clearly and professionally, a skill that is needed in the laboratory field.

Interdisciplinary Collaboration in the Development of a Cultural Awareness Survey

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Cultural awareness of the rich Oklahoma and global cultural diversities is a Northeastern State University educational goal intended to supply students with information regarding customs, beliefs, communication and educational needs of various ethnic groups. Faculty from the graduate Nursing Education Program and undergraduate Medical Laboratory Science Program collaboratively developed a discussion forum, aptly named Cultural Awareness Discussions. The online forum invited guests from various cultural groups to answer student questions regarding unique customs and beliefs. The course is intended to promote compassion, understanding and sensitivity to the students and patients served at regional education and health care facilities. The course utilized the online Blackboard Learning platform as the vehicle for guest/student interaction. Students were free to ask any question regarding cultural beliefs and customs especially

regarding health, illness and death. Prior to posting questions to the guests, students were asked to submit an anonymous (number assigned by non-faculty administrator) pre course survey of ten questions that addressed student's attitudes and knowledge of cultural customs and beliefs. Students submitted the same survey at the end of the semester (post course survey). Pre and post survey averages for each paired submission were calculated based on a range of 1(not confident) to 5 (very confident) for each question. Statistical evaluation of pre and post paired responses in both disciplines demonstrated that averages for each question increased in the post survey. The increase in confidence suggests that students gained knowledge and appreciation of cultural beliefs and customs upon completion of the course.

Personalized Education Plan: A Paradigm Shift in Virtual Competency Based Education**

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The recent economic down turn has forced healthcare organizations to cut their budgets including allocations for continuing education. At the same time the complexity of clinical laboratory testing is increasing. However the need for more continuing education in clinical settings has never been greater. Seizing the opportunity, the diagnostic industry vendors can provide cost-effective ways to deliver sound continuing education programs to healthcare professionals. Siemens Healthcare Diagnostics has developed a unique platform called Personalized Education Plan** (PEP) for presenting virtual education based on adult learning principles (knowledge, skill, and ability). With classroom equivalency PEP is identical to traditional classroom education curriculum. PEP's three content libraries (Instrument Specific, General Laboratory, and Clinical Applications) approach education in a holistic manner, because laboratory professionals need to know more than just how to run instruments. Since its launch in 2011 The Siemens' PEP has been accessed by tens of thousands of learners around the world. General Laboratory library focuses on topics of interest to all laboratory professionals regardless of the discipline in which they work while Clinical Applications library focuses on disease state management. The Siemens' PEP is also being used as a teaching tool for CLS students by several universities, including the University of Canberra in Australia. Personalized Education Plan* offers comprehensive, competency-based virtual training and education using adult learning principles. Its user-friendly format can be tailored to job roles. PEP is an effective way to deliver continuing education to laboratory professionals.

** Patent pending

Student Engagement and Learning Strategies in Online Courses

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As our Clinical Laboratory Science program transitions further to a hybrid education delivery format, program faculty have become interested in the changes in learning strategies that students employ to accommodate online educational environments. We also investigated the kinds of online instructional experiences the students found most engaging. Student participation aspects of three of our courses were reviewed. One course was delivered entirely online, another course was blended with approximately 70% online, and the third course had 15% online activity. Students enrolled in these courses participated in two surveys in which they were asked about ideal online course features and about changes in their learning strategies with respect to online course delivery. Only students that participated in all of these activities were considered for in depth interviews. Based on their responses to the survey questions, eight students were identified as candidates for interview, four of which chose to participate. In these interviews, students were asked to compare their learning strategies used relative to the level of online course activity and what they found most engaging. In addition, students' ideal online course features were queried. In general, students commented that these approaches forced them to adopt a more independent learning strategy and that this was, overall, a positive outcome. Many students found synchronous online experiences more engaging than asynchronous activities. We conclude that, with the appropriate instructional design, hybrid educational models can effectively engage students and support independent life-long learning. The program anticipates incorporating these findings into future course

development.

Use and Acceptance of Information and Communication Technology Among Laboratory Science Students

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Online and blended learning platforms are being promoted within laboratory science education under the assumption that students have the necessary skills to navigate online and blended learning environments. The purpose of this study was to explore factors that affect use and acceptance of information and communication technology (ICT) among laboratory science students through the theoretical lens of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, developed based on eight models used in earlier research to explain information technology use and acceptance. An electronically delivered survey consisting of nine demographics questions and 32 ICT-related survey questions drew upon current students and recent graduates (within two years) of all accredited laboratory science training programs listed on the NAACLS and AABB Web sites in June 2012. During the four-week data collection period, 168 responses were received. Results showed that the UTAUT model did not perform well within this study, explaining 25.2% of the variance in use behavior. A new model incorporating attitudes toward technology and computer anxiety as two of the top variables, a model significantly different from the original UTAUT model, was developed based on the findings that explained 37.0% of the variance in use behavior. The potential significance of this study may affect curriculum design of laboratory science training programs wanting to incorporate more teaching techniques that use ICT-based educational delivery.

Technology Demonstrations

Just the Right Image: Capturing Microscopic Images for Custom-made Presentations

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Educators in Medical Laboratory Sciences curricula often need fresh images to challenge students during laboratory sessions as well as for skills evaluation. Although many image banks and videos are available for purchase, sometimes educators have unique specimens in their collections of smears or live specimens and may like to capture an image to incorporate into educational materials. In addition, clinical sites may provide an opportunity for educators or students to capture images of not-commonly-available specimens. Some of the laboratory skills students must develop require an understanding of how the use of various focal planes when performing microscopic observations aids in the identification of an object, cell, or organism. Demonstrating the use of focal planes and motion on a microscopic level is best observed as a laboratory exercise. Educators may be able to shorten the time it takes students to grasp these skills in the laboratory if they can provide students with previews of these skills by incorporating images and short video clips into their classroom presentations. This technology demonstration shows educators how to use an intra-ocular digital microscope camera to capture still images as well as short videos for use in educational materials they wish to develop. Having the image capture software loaded on a portable device makes it possible to go to where the specimens are to capture them virtually.

Managing Affiliation Agreements

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The management of affiliation agreements with clinical practicum sites can become cumbersome for a small medical laboratory sciences educational program, and it is a common problem for many medical laboratory sciences programs, small and large. The Medical Laboratory Sciences program of Wichita State University presents their method for organizing affiliation agreements and information about those clinical affiliation sites through a Microsoft Access database. The Wichita State University database is used to make copies of clinical affiliation agreements available for viewing by multiple faculty and departments throughout the Wichita State University College of Health Professions. The database stores essential contact information, initiation date of agreement, and expiration date of agreement for the clinical facilities. Information about unique requirements of a particular clinical practicum site is available for each site. Use of the database has resulted in more efficient use of clinical sites and better monitoring of agreement expiration dates. The database may be merged with similar databases of other Health

Professions for global review of sites in use by large organizations. The format of the database may be appropriate for other programs of health professions, looking to organize affiliation agreement information for viewing by more than one department in a timely manner.

Use of Short Hematology Laboratory Procedure Videos for Enhancing the Online and Onsite Learning Experience for Students

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Educators continually take time from the students' laboratories to give a discussion and demonstration of the procedure to be performed prior to the laboratory exercise. In addition, in an online hematology course, it is impossible to demonstrate the laboratory procedure to the entire student class at one time, if the delivery is asynchronous. Incorporating new strategies combined with the traditional lecture format can increase the student's learning outcomes in terms of knowledge, skills, and attitudes. Five to eight minute hematology procedure videos were prepared for the following laboratory exercises: 1) Making A Slide For Examining Peripheral Blood Smears, 2) Unopette And Loading A Hemocytometer, 3) Manual Reticulocyte Counts, 4) Performing Sickle Solubility Tests, and 5) Performing Sedimentation Rates. Highlights of the production process will be demonstrated with the videos. Laboratory demonstrations are a time-consuming exercise, often requiring one-on-one instruction with the student. In addition, these discussions and demonstrations need to be repeated for each new class. Using these short hematology laboratory procedure videos can reinforce concepts for the student, allow them to view them as many times as needed, and definitely saves time for the instructor.