

Implementing an Online CLS Curriculum Utilizing the Reverse Lecture-Homework Paradigm

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Introduction

Mayo Clinic implemented a new 43-credit curriculum in Clinical Laboratory Science (CLS), utilizing a blended model of traditional and online content delivery. The didactic component of our curriculum design is developed in an e-learning platform and is underscored by transactional distance theory (Moore, 1983) whereby the 3 modalities of learner interaction with content, instructor, and fellow students are integrated into the e-learning module. The lesson plan also includes a laboratory module taught by traditional methods of interaction between the instructor and learner. Our curricular model implements the "reverse lecture-homework paradigm" whereby our students complete the web supported didactic modules asynchronously as "homework" assignments and complete laboratory lessons in the classroom under the guidance and direction of their instructor.

In this constructivist model of education, the instructor moves away from the traditional teaching role to that of facilitator of the student's acquisition of knowledge. Additionally, more time is available for the laboratory section of the lessons which are "hands-on" and are developed in the context of the work our student's will perform upon employment.

The Need for a New Teaching Model

There is a significant shortage of individuals trained in the field of clinical laboratory science to work in medical laboratories and it is listed by the Bureau of Labor Statistics as a critical workforce shortage area. In 1990 there were over 420 accredited CLS programs graduating over 3000 students nationally, down from 652 programs in 1980 producing over 6000 graduates. In 2005 there were 228 programs producing ~2300 graduates at a time when the Bureau of Labor Statistics projects the need for 12,000 graduates annually through 2010. The decrease in the number of programs is in large part due to the high costs associated with training individuals in the field of clinical laboratory science.

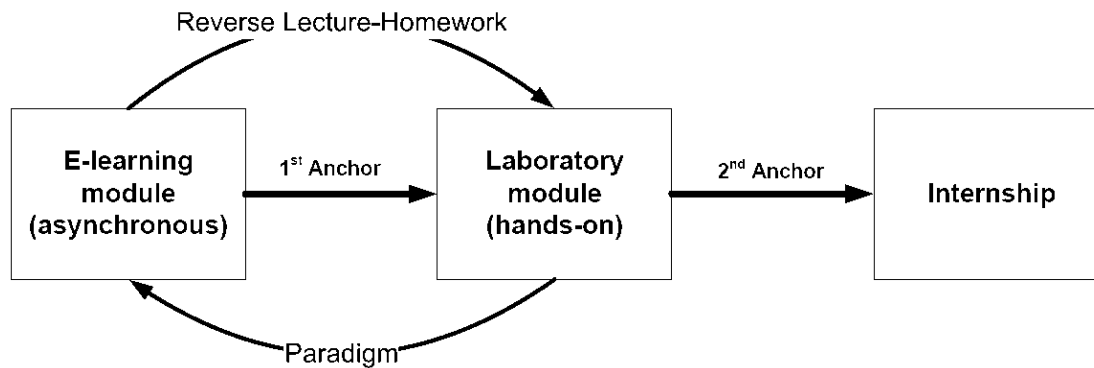
By implementing an e-learning platform, our program curricular model has potential to expand the number of students over time towards an improved economy of scale. We have potential to increase our class size by expanding our program from Mayo Clinic, Rochester to Mayo Clinic, Jacksonville and Mayo Clinic, Scottsdale without having to incur the operating costs associated with redeveloping the entire 43-credit curriculum at each site.

Additionally, by implementing the reverse lecture homework paradigm, our students spend more time in the teaching laboratory in hands-on lessons that more closely parallel the work they will do once they become employed. By providing a curriculum that is designed to provide more time with the practical experience component, we anticipate that upon employment our students will be productive sooner, thereby reducing the costs associated with on-the-job training.

Curricular Model

The Clinical Laboratory Science (CLS) curricular model applies the reverse lecture-homework paradigm. Students complete didactic curriculum as homework, asynchronously, via online lectures, and participate in daily laboratory lessons in the traditional, “face-to-face” format. The electronic curriculum includes student interaction with written content (“learner-content”), threaded discussions (“learner-learner”), and email (“learner-instructor”). The online material is applied directly during “hands-on” instructor facilitated laboratory sessions which are a combination of case studies, laboratory lessons, and discussion groups.

By implementing this specific curricular design, our instructors have more time to spend with our students in the teaching laboratory focusing on the application of the online content in the context of a laboratory lesson or case study. The curricular design allows for greater anchoring of the material in the context of the work the student’s will perform upon employment.



Outcomes

Our preliminary results after completion of several courses utilizing the reverse-lecture homework paradigm, demonstrate that this curricular model is as good, if not better than traditional models. Our students state that they prefer this new model over the traditional, and they excel in CLS courses that implement the reverse-lecture homework paradigm over those courses delivered in a traditional lecture format. Our clinical experience faculty note that our student’s are highly prepared and arrive at the clinical laboratory rotations (internship) familiar with our standard laboratory operating procedures and perform at an advanced level. The final outcome measures of our program performance will include evaluation of our student’s national board score performance against other CLS schools and feedback from employers about their performance “on-the-job”.

A benefit of an electronic curriculum includes the opportunity to share the CLS curriculum across all 3 of our Mayo Clinic sites, enroll distance students at Mayo Clinic, Jacksonville and Mayo Clinic, Scottsdale and eliminate the costs associated with duplication of effort. This model will therefore reduce the operating cost to run the program at Mayo Clinic, Rochester and decrease the cost to start programs at Jacksonville and Scottsdale.

Along with reducing costs by eliminating duplication of effort across our Mayo Foundation sites in Florida and Arizona, capturing the curriculum in an e-learning format also allows us to preserve this ever-expanding body of knowledge and develop employee centered e-learning

programs. Once the CLS curriculum is developed in an e-learning format we have the option to implement employee centered 16-18 credit categorical programs in clinical chemistry, clinical microbiology, clinical hematology, and transfusion medicine. Employees lacking national board certification in the clinical laboratory sciences will benefit from a categorical certification and the opportunity to sit for a national board examination.

References

- 1.) Forster, Ann (2004). The Teaching Learning Process. *Learning at a Distance* (pp. 50-73). University of Wisconsin, Madison, Distance Education and Professional Development.
- 2.) from NAACLS letter: Olive M. Kimball (personal communication, Dec. 29, 2005)
- 3.) Moore, M.G. (1983). On a theory of independent study. In D. Sewart, D. Keegan, & B. Holmberg (eds.), *Distance Education: International Perspectives*. London: Croom Helm.
- 4.) Moses, Greg. Faculty Perspectives on Streaming. University of Wisconsin, Madison, Distance Education and Professional Development. Retrieved May 15, 2009 from http://streaming.wisconsin.edu/teaching/fac_moses.html
- 5.) U.S. Dept. of Labor, Bureau of Labor Statistics. (2004). *Occupational Projections and Training Data* (2004-2005 edition, p.84). Washington, D.C.

Biographical Sketch

Sue Lehman graduated from the University of Wisconsin – Madison in 1983 with a B.S. in medical technology. In 1991, she completed her masters' degree in psychology and counseling services from Saint Mary's University in Winona, Minnesota. She worked as a medical technologist at Mayo Clinic in the Division of Clinical Microbiology for 10 years. Subsequent to this she became involved in education at the medical and allied health level and led the establishment of academic programs in clinical laboratory science in the Department of Laboratory Medicine and Pathology. She has 15 years of teaching experience and is Program Director of the Clinical Laboratory Science Program at Mayo Clinic and is also course director for CLS Clinical Microbiology I and II. Her areas of interest are in distance education and education methodology.

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