

**LSU
Health Sciences Center
New Orleans
Quality Enhancement Plan**



**January 2005
(Revised July 2005)**

Table of Contents

Executive Summary:

Using Educational Technology to Enhance Student Learning 1

Use of Patient Simulators in Instruction2

Web-Based Learning:

Laptop Computer and Digital Library Requirement 10

Current Protocols Online 26

The Relationship of Quality Enhancement Plan to the
Campus Strategic Plan 30

Institution-Wide Assessment of the Quality Enhancement Plan..... 30

References 32

Executive Summary and Introduction of The Quality Enhancement Plan: Using Educational Technology to Enhance Student Learning

The six Schools of the LSU Health Sciences Center in New Orleans have a strong history of collaboration. The Health Sciences Center's Planning and Implementation Committee (PIC) provides a venue for the ongoing exchange of ideas and fosters interdisciplinary approaches to education, research, and planning. For example, the School of Dentistry has previously collaborated with the Schools of Nursing and Allied Health Professions in the implementation of a test-scoring program. The Quality Enhancement Plan of the Health Sciences Center will build upon this history of collaboration and will extend these collaborative activities focusing on the enhanced use and effectiveness of instructional technology. The Plan has had and will continue to have the active input of students from each of our Schools. The use of Instructional Technology will focus on two major educational activities that reflect the ongoing development of educational technology both within and outside of the more traditional classroom or laboratory environment.

Over recent years, both faculty and students have witnessed computer and communication developments that are transforming both how training is obtained and information delivered. In relation to training, the recent introduction of computer-controlled patient simulators is changing the manner in which health care professionals are trained (Groopman, 2005). In relation to information delivery, the Internet and the World Wide Web have dramatically changed the manner in which libraries deliver information to their constituents (Lindberg and Humphreys, 2005). While these may, at first glance, appear to be unrelated instructional technologies, they are in fact both related and central to the core competencies of education in the health care professions. Students must be exposed to each technology in order to ensure their success as life-long learners, a characteristic critical to both their education and professional careers. The Plan focuses on the development of technology in several of our Schools with the long-term objective of integrating these programs across all of our Schools.

The Schools of Dentistry and Medicine have recently begun to integrate the use of patient simulators in their curricula. The purpose is to provide students with designated patient care and critical thinking skills that complement their actual clinical experience and help to reduce medical errors. The plan is to enhance this method of instruction in the curriculum of the Schools of Medicine and Dentistry and to begin to introduce this technology into the curricula of the Schools of Nursing and Public Health. We also plan to implement and enhance web-based instruction and testing. The School of Graduate Studies will establish a program of web-based protocols for scientific methods and techniques. Students involved in research in all of the Schools of the Health Sciences Center will have the opportunity for training in the use of this resource. The School of Dentistry will adopt a laptop computer and digital library requirement for each student. The School of Allied Health Professions has indicated interest in this program and the

School of Dentistry will provide information concerning implementation and educational efficacy of the program as the information becomes available.

According to a recent report from the Institute of Medicine, medical errors, often due to miscommunication between health professionals, cost the U.S. healthcare system up to twenty nine billion dollars each year. An added benefit of our Plan as it is implemented is that it will begin to diminish the “silo structure” typical of many health education programs and foster interdisciplinary learning across our Schools. Such programs are in fact gaining attention nationally (Howell, 2005).

Use of Patient Simulators in Instruction

History of LSUHSC-NO Simulation Laboratories

Simulation laboratories at the Health Sciences Center were first established by the School of Dentistry in 1996. Two state-of-the-art simulation laboratories with a total of 62 units are currently operational at the School of Dentistry. The labs provide dental and dental hygiene students, as well as practicing dentists, the opportunity to learn the latest in dental procedures under close-to-actual clinic situations. Developing skills in the simulation labs helps students to transition easily from pre-clinical studies to the actual treatment of patients. The simulation laboratory units closely duplicate the dental units that the students utilize in the clinic.

For assessment of learning, the simulations models allow faculty to standardize instruction, reliably assess skill and evaluate competency. The multi media capabilities allow faculty to conduct demonstrations of clinical procedures while student work in the simulations units. Additionally they provide a venue for students experiencing problems in the clinic to go back to simulation and correct their deficiencies. Each station is complete with hand pieces, water sprays, operator and assistant instruments, lights, mannequin heads and articulators that closely match the clinical situation. In addition, the laboratory contains TV monitors and other equipment to aid in the educational process.

Initially the simulators were purchased with interchangeable jaw models for the periodontal series, additional models have been purchased for oral surgery, pediatric, prosthodontic, and endodontic procedures so that a simulation can be produced for all specialty areas of dentistry. The Patient Simulation Laboratories offer both the opportunity for new approaches to preclinical and clinical instruction as well as the opportunity for skill development in procedures that may not be available in the LSUSD clinic. Additionally, all students receive training on ergonomics as a part of the introduction to the simulation laboratory.

In the 2003-2004 academic year simulation laboratory exercises were incorporated into 12 dental hygiene and dental courses for a total of approximately 428 hours of instruction. The plan for implementation includes expanded use of the simulation

laboratory in the preclinical courses and incorporation into clinical courses. A logical extension of these efforts is to integrate simulation exercises into the curricula of our other school.

Background: School of Medicine

A major thrust of medical education reform in the United States is competency-based education. We have done a good job teaching and assessing knowledge but not as well assuring each graduate has the skills and competencies necessary for the practice of Medicine. One way to address uniform exposure to and learning of potentially invasive skills is to use simulation much the way the airlines use it to train pilots. The School of Medicine utilizes simulation in three ways.

First, we employ a program called Diagnostic Reasoning (DxR), which is a computer set of more than 70 patients. Students sign on and do a complete history and physical as well as order lab tests. At each step they must interpret the data their investigation yields (e.g. when they want to look at the eye they get an actual picture of the retina) and begin to assimilate the data into a plan using clinical decision-making. On average, they work up a patient a week with this program. Each patient is tied to the concurrent Basic Science Curriculum and the cases are discussed each week by a team of clinicians and Basic Science faculty. The decisions made by each student, and those made by the whole class are evaluated and feedback is provided to the students. More information on this can be found on the School of Medicine's undergraduate curriculum webpage under DxR: http://www.medschool.lsuhs.edu/medical_education/undergraduate/default.asp

Second, we have developed a complete clinical skills lab in which we assure that each student learns and is evaluated in common clinical skills. These range from knowing certain heart sounds and other physical exam findings, utilization of common monitoring and therapeutic equipment (e.g. defibrillators) and invasive procedures (arterial lines, lumbar punctures, central lines, etc). Before the students enter the clinical arena, they are instructed in each of these skills. More information can be found at the following website http://www.medschool.lsuhs.edu/medical_education/undergraduate/default.asp .

Third, we have implemented a longitudinal curriculum in full body or high fidelity human patient simulation, which can be viewed on the internet by going to http://www.medschool.lsuhs.edu/learning_center/human_simulation_center.asp. In our curriculum students learn to manage complex medical situations such as arrhythmias, cardiorespiratory arrest and other conditions. An excellent video of students in a simulation session and other features of our simulation project can be found at www.learningcenter.lsuhs.edu . We are not aware of any other schools in the United States employing simulation in such a comprehensive manner.

Enhancement Plan

We are cognizant that medical information is quickly outdated and we are dedicated to developing both the facilities and programs to address the continuum of life-long learning through continuing medical education. We will soon begin work on an additional 14,000 square feet of the Learning Center dedicated to advanced simulation and surgical skills development. This expansion will be directly above and connected to the current Learning Center and allow for the entire 28,000 square feet to function as one unit.

Another major field that lends itself to simulation is Surgery. Of note, a major advance in the last few years has been the field of minimally invasive surgery (**MIS**). We have acquired a group of “box trainers” and other simple simulation devices to design and implement a longitudinal curriculum in MIS starting early in Medical School. In addition to the positive feedback this will provide students, it will allow us to identify early on those students who do not have the technical ability to pursue a surgical specialty before they have dedicated several years of their life pursuing graduate training in this area. Because MIS occurs by definition in a small and often microscopic field of vision, special operating rooms (**ORs**) are now needed for conducting this surgery. In these ORs, the image from the surgical field along with other data fields is displayed on multiple monitors in the OR. We have recently constructed a state of the art MIS OR in our simulation center. A picture showing a class using part of the room to project laparoscopic surgery on a pelvis model is shown on the front cover of this QEP.

With these MIS simulators, we can tailor instruction to any stage of the continuum of life-long learning from novice to experts requiring retraining.

Another major planned use of the MIS OR involves combining the full size medical simulator, which can simulate a variety of common medical emergencies with a surgical simulator. With this setup, we will be able to conduct a surgical operation while at the same time the medical simulator experiences a number of preprogrammed medical complications such as intraoperative myocardial infarction. The goal of this is to reduce OR errors and teach OR crisis management using a proprietary curriculum in error reduction and patient safety involving improved communication and team training skills. Our plan is to utilize interdisciplinary teams from hospitals and the various schools of the Health Sciences Center to develop and implement this program.

Project Funding

The initial architectural estimate for expansion of the Learning Center is \$2,050,000. The preliminary budget and architect’s drawings are shown in the Appendix. When the expanded Learning Center is operational in summer 2006, we will have the ability to offer our students the continuum of education via simulation – undergraduate, graduate, and postgraduate – in one facility.

With the development of the new facility, there will also be a need for trained faculty to teach and maximize the students learning experience through simulation. The School of

Medicine has raised \$600,000 for the Harvey A. Gabert, M.D. Chair for the Department of Obstetrics and Gynecology. The School has submitted an application to the Louisiana Board of Regents for \$400,000 in matching funds to complete the Chair. The chair will combine a teaching and scholarly educational research focus in which teaching is the preeminent focus. As noted above, new technologies are developing in the area of endoscopic and minimally invasive surgeries and require different skill sets than with traditional “open” surgeries. With the number of gynecologic surgeries decreasing because of better medical therapies, the need to teach fundamental techniques using simulation rather than direct patient care is evolving. Simulation for teaching surgery is in its infancy. There are few centers in the United States that are focusing on gynecologic simulation. An emerging area of concern nationally and within Louisiana is the ability to assess the surgical skills of individuals who wish to enter surgical specialties, their ability to demonstrate competency prior to entering the clinical arena and ongoing assessment of surgical skills throughout a career. Currently, there are no validation measures in gynecology and few exist for surgery. While there are products being introduced into medicine, primarily in cardiology, that purport to assess skills in cardiac catheterization, these products have not been educationally validated in large-scale studies.

The Harvey Gabert Chair will allow us to maximize the benefits of a virtual operating room for students and residents by allowing for a specific focus on gynecological surgery. The Chair will also foster increased interaction with operative subspecialties such as General Surgery, Orthopedics, Neurosurgery, and Cardiothoracic surgery. Specifically, the Gabert Chair will allow a clinician educator to work with students in the simulation lab for at least 40-50% of his or her time and to develop techniques to teach and assess surgical skills. This will enhance LSUHSC’s role in the process of furthering an objective method of teaching, training, and remediation of medical students and residents. It is anticipated that the Chair will be a recognized expert in gynecologic and minimally invasive surgery with a background in simulation. The Health Sciences Center recognizes that a chair alone may not be sufficient to attract the most qualified candidates. Therefore, the School will also commit a line item Full Professor position at \$100,000 (base) along with a “start-up” package of \$750,000 for new equipment in the Learning Center.

Interdisciplinary Training in the Human Simulation Center

Over the past several years, we have had preliminary discussions and several pilot programs using the Human Simulation Lab in which the Medical School has collaborated with the other Schools of the Health Sciences Center. For example, the Department of Physical Therapy in the School of Allied Health professions has developed some teaching activities using some of the partial body simulators. We are currently doing team-training sessions with Nurse Anesthesia (CRNA) students in preparation for more formalized sessions as described below.

One of the significant problems in the health care sector is medical errors. One of the causes of error is poor communication, task execution and other consequences of breakdown of teamwork. The airlines industry recognized similar problems decades ago

and is far advanced in this method of team training known as Crew Resource Management (CRM). Our aim is to transfer many of the principles employed by the airlines in CRM into highly dynamic health care environments, starting with operating rooms (ORs) and extending to other such environments including emergency rooms, intensive care units, catheter labs, etc. Under the direction of Dr John Paige, we have developed a program in OR safety called the SAFETY Prep™ that stands for Structured Assessment Fostering Enhanced Teamwork Yield. Our plan is to have teams of students and trainees from the various schools (Nursing, Allied Health, Public Health and Medicine) participate in complex OR crises using our patented Human Simulation programs. Communication and other teamwork skills will be emphasized by employing the SAFETY Prep.™ The goal is early recognition and mitigation of OR errors. This training has been designed to improve OR efficiency as well as responses to crises.

Our eventual plan is to employ virtual surgical simulators and/or interventional vascular simulators in conjunction with high fidelity whole body simulators in multiple rooms to create in effect a virtual hospital environment where the entire throughput of multiple simultaneous patients can be studied. We will expand the space, increase the number of simulators for the task, and tie currently isolated curricular pieces together and enlist faculty to supervise and guide the learners.

In addition, the School of Medicine will continue and expand the collaborative program with the School of Public Health that uses portable simulations to train first responders in management of medical consequences of bioterrorism attacks in the field.

Assessment and Evaluation Plan for the Use of Simulators in Instruction

As shown below, the goal representing the primary educational mission of the School of Medicine for undergraduate medical education was used to identify the primary objectives and assessment plan for the Quality Enhancement Plan objectives and assessment plan that follows.

Primary Educational Goal: Graduates of the LSU School of Medicine demonstrate the knowledge, skills, and attitudes associated with competent, professional, and caring undifferentiated physicians who are well-prepared to succeed in a the first year of residency education for a specialty of their choice.

Expected Outcomes of the Quality Enhancement Plan: By the end of each year (formative assessment) and by the end of the project period (summative assessment), the following outcomes will be examined to assess effectiveness and achievement. Table 1 references each of the expected outcomes and provides descriptions of the intended timeline, leadership, activities, measurement and evidence of achievement, and use of results for continuous improvement.

1. Expansion of state-of-the-art facilities for simulators in teaching, learning, and assessment will be completed and utilized by faculty and learners.

2. Faculty members and learners will perceive the simulator resources and activities of the Isidore J. Cohn, Jr. Learning Center to be a highly effective and integral component of health professions education at LSUHSC-New Orleans.
3. Significant increases will be observed in the use of human patient simulators across Years 1-4 of the M. D. curriculum.
4. Significant increases will be observed in inter-professional opportunities for simulation-based teaching, learning, and assessment.
5. As related to specific simulation-based teaching/learning, learners will demonstrate significant gains in objectives-based knowledge and skill performance.
6. As related to specific simulation-based teaching/learning, learners will demonstrate enhanced understanding and appreciation of various health professionals' contributions to health and patient care.

Introduction, adoption, implementation, and incorporation of simulation-based teaching, learning, and assessment will be evolutionary, involving many individuals and complex processes. Curriculum development, instructional design, development, and validation of specific assessment criteria and measurement will be necessary for each instructional innovation, as well as considerable negotiation, collaboration, faculty professional development, and reflective practice. Consequently, most assessment activities will be ongoing throughout the five-year project period. In general, Year 1 will focus on establishing enhanced facilities and resources, identifying relevant opportunities for using human patient simulators, recruiting and establishing initial faculty teams within the School of Medicine and across the various schools (i.e., inter-professional learning), and obtaining relevant baseline assessments of participation and learning. Year 2 will focus predominantly on the initial development and pilot testing of specific curriculum innovations and corresponding measurement and assessment processes. Faculty professional development will also be an integral and necessary component. Year 3 will use the results of Year 2 for continued refinement of curriculum modules and assessments and target expanded and new curriculum modules. Years 4 and 5 will reflect a continuation of systematic educational development and assessment processes from previous years, with Year 5 also targeted for summative assessment of the overall effectiveness of the Quality Enhancement Plan and new directions beyond Year 5.

Similar assessment and evaluation strategies will be used for health care students from other LSUHSC-NO schools as they are integrated into the program.

Learning Center Proposed Virtual Operating Room



TABLE 1

Target	Objective	Leadership	Activities	Measurement/Evidence	Use of Results
Year 1	1	C. Hilton J. Paige V. Kozmenko	Acquire portable simulators and complete set up of surgical simulation suites (minimally invasive surgical skills, cardiovascular)	Direct observation and demonstration Purchase orders Asset records	Ongoing assessment of facilities and assets will guide expansion for future years
Year 1	1	C. Hilton	Complete expansion of Learning Center	5 th floor expansion is occupied, open and available for intended uses	Use of the expanded Center and ongoing monitoring of activities in the Center will guide future innovations and activities
Year 1 and ongoing	2	C. Hilton J. Paige Gabert Chair	Present informational sessions to course/clerkship faculty and key committees and departments regarding opportunities to incorporate simulation based learning in educational programs	Presentation log Log of follow up inquiries from interested faculty	Education committees will be key in facilitating curricular changes that incorporate simulation-based teaching/learning and assessment
Year 1 ongoing	2	C. Hilton S. Chauvin Faculty team leaders for curriculum innovations	Attitudinal scales and assessment protocols, appropriate to the specific uses of simulators will be developed and used at least annually to assess faculty and learners' perceptions of the effective use and value added by simulation-based teaching/learning. For specific curriculum and simulation-based training modules, perception data will also be obtained from participants	Questionnaires, interview and focus group protocols Summary results of quantitative and qualitative analyses, appropriate to each applications Summary reports	Results of assessments will be shared with appropriate audiences and use for formative and summative evaluation As appropriate to educational programs, scholarly products will be developed and disseminated via appropriate peer-review venues
Year 1 and ongoing	3,4	C. Hilton S. Chauvin	Monitor use of simulation resources Seek opportunities through committees and department/school leadership to inform and encourage use of simulation-based learning and assessment, as appropriate to educational goals and contexts	Usage logs for various suites Record of presentations Review of curriculum and project reports Review of enduring educational materials resulting from simulation-based educational innovations	At least annually, assessment results will be shared with relevant educational leaders and committees to facilitate continuous improvement and to maximize impact on student learning and development
Year 2 and ongoing	5,6	C. Hilton S. Chauvin J. Paige V. Kozmenko Faculty team leaders	Specific assessment criteria and appropriate evaluation design and methodology will be developed, as appropriate, for specific instructional applications and the corresponding expected learning outcomes	Questionnaires School-based knowledge tests Performance and observation-based assessments External measures (e.g., NBME subject exams, USMLE licensure exams) Graduation and post-graduation measures	At least annually, relevant assessment results will be summarized and examined in light of expected outcome statements to assess achievement and to guide decisions related to continuous improvement and ongoing educational development

To add clarity to the assessment and evaluation plan, the paragraphs that follow provide examples of major activities and directions already underway. We have grounded much of our initial assessments and plans for continuing development in performance-based assessment methodology and Kirkpatrick's four levels of training effectiveness evaluation (1 = reaction, 2 = learning, 3= behavior change/real life performance, and 4 = results/outcomes).

Diagnostic Reasoning (DxR) Cases

Student performances on these cases are currently being used to monitor individual and cohort learning and to provide feedback about learning. We intend to work with cases and case authors to identify critical performance indicators for specific cases and developing assessment standards for formative and summative assessment at the individual and group/cohort level. Because the DxR product was not designed to support this particular type of standards-based assessment, and there are no validity and reliability results pertaining the scoring algorithm contained with the DxR system, our assessment instrument development work in this area is important. While this requires considerable effort and time to accomplish, when achieved, we will be able to monitor and assess individual student performance over time and be able to aggregate individual performance for the purposes of cohort analysis. Such results will contribute significantly to enhancing our outcomes assessment processes and continuous curriculum improvement efforts for the M. D. degree program and for contributing to enhancing institutional effectiveness of the School of Medicine.

Clinical Skills Lab (CSL)

This laboratory was used first for creating the pre-clinical, clinical skills curriculum, the first of its kind in the United States. A longitudinal study using a self-administered questionnaire for all medical students annually began in the spring of 2002 and continues. Data have been examined and used annually for providing feedback to appropriate medical educators and educational committees, including the Curriculum Oversight Committee, and for continuously improving the CSL curriculum for pre-clinical students (Years 1 and 2). The content of the questionnaire targets two predominant perspectives related to the 34 clinical skills taught in the two-year curriculum sequence: 1) Self-efficacy, measured as self-reported confidence for each targeted clinical skill using a five-level taxonomy of performance expertise (Dreyfus model), and 2) Practice, measured as self-reported frequency of performing each targeted clinical skill in the clinical setting. We will continue to use and enhance the use of the Clinical Skills Lab for student learning. Future assessments will target direct measures of knowledge acquisition and observation-based assessments of clinical skills performance.

We have implemented resident skills fairs (5 stations) for Medicine, Pediatrics, and Emergency Medicine residency programs. Pre and post session questionnaires are administered. Gains in self-efficacy for targeted skills have been consistently significant ($p < .01$). We are currently developing observation-based assessment systems to measure direct learning outcomes. Faculty members are involved in developing specific

competencies and exit learner outcomes for educational programs (e.g., MD degree and residency programs). The development and implementation of rigorous and appropriate assessments corresponding to these outcomes are planned and will facilitate and support group/cohort and program evaluation capabilities necessary for effective and ongoing outcomes assessment. Solid outcomes assessment processes will, in turn, facilitate continuous curriculum and program improvement that is necessary for assessing and enhancing ongoing institutional effectiveness.

High Fidelity Human Patient Simulation (HPS)

A major innovation in the M. D. degree program using HPS technology has been the development and full implementation of a required curriculum for third year students that addresses emergent patient problems using team-based learning and authentic and responsive patient scenarios. Initial knowledge-based assessments were developed and used. Continued development of curriculum modules and development of additional assessment tools for individual and team-based performance are underway. An assessment rubric for clinical reasoning has been under development since 2003 and is near ready for use. The development of rigorous and competency-based assessment is labor intensive, but necessary for enhancing students' learning of complex content and skills and for enhancing overall educational program effectiveness.

Minimally Invasive Surgical Simulation (MIS)

Simulation-based teaching/learning and assessment has been recently expanded at LSUHSC-New Orleans with the recent acquisition of equipment to establish a Minimally Invasive Surgical Simulation (MIS) suite in the learning center. At present, we are developing measures for obtaining resident feedback about teaching/learning with this technology, a study of teaching/learning effectiveness with MIS comparing three teaching/learning methods, and an assessment protocol, instrument, and assessor training model for video-based assessment records of resident performance using simulation tasks for specific surgical skills. The particular focus has been on achieving specific learning outcomes that reflect professional skills training for core competencies and associated critical performance.

Web-Based Learning: Laptop Computer and Digital Library Requirement

Background

As in all aspects of higher education, dental professional education has experienced considerable debate and planning concerning future trends. In the past decade, there have been numerous calls for change. In 1995 the Institute of Medicine report entitled, "Dental Education at the Crossroads: Challenges and Change," recommended significant curricular reforms relative to content and presentation. The recommendation included

“setting timetables for modernizing courses to include designing an integrated basic and clinical science curriculum that provides clinically relevant education in the basic sciences and scientifically based education clinical care... in addition, to increase linkages between dentistry and medicine to prepare students for a growing volume of patients with more medically complex problems.”

An article by Hendricson, published in 2001, further addressed components of a dental education reform agenda. Included in the eleven recommendations for reform was – utilizing computer based and web-based information to enrich student learning. The vision of dental education is being shaped by “future dentists’ need to keep pace with rapid developments in medicine and biomedical science and changing health-care delivery mechanisms,” the need “to support lifelong learning” and, “new developments in cognitive science demonstrating learning environments need to be more student-centered, to emphasize active learning strategies.” The implementation of computer technology and e-learning formats offers a means to support addressing this vision.

Schlossberg in a 2003 article on changes in dental education states that “that the creation of several new dental schools, all with state-of-the-art digital technology has pushed many older institutions to invest the time and money to implement real change.” In discussing the use of textbooks, he describes the view of students carrying armloads of textbooks and supplemental materials to lecture halls, labs and clinics is being replaced with students holding laptop computers and CD-ROMS and DVD’s.

Dentistry, as all components of health science, is dependent on informatics. Every aspect of the continuing education for dental professionals and the delivery of clinical care relies on computers and computer networks. LSUHSC School of Dentistry has utilized computer infrastructure for more that 15 years to help faculty and administration facilitate an efficient learning environment. Because producing computer expert graduates has become so important to the present capabilities of education and the future of these health professionals, the school believes that it should immediately embark on a multi-year plan to initiate and integrate a student-oriented informatics program.

A number of dental schools are making the transition in this direction. It is an important change for enhancing the educational process. In conjunction with the implementation of computer technology, an electronic curriculum in dentistry has been developed. “The idea behind the e-curriculum is more than just digitizing course manuals and textbooks. It’s a new way to teach and learn...It allows students to collect and collate a diverse amount of information quickly.” The e-curriculum has the potential for creating a more integrated curriculum. It has the further benefit of offering resources to assist faculty in the preparation of educational materials.

Starting with the 2001-2002 academic year, the LSUHSC-NO School of Medicine began a program that required all incoming students to purchase a standardized laptop computer. In addition to using laptops in instructional programs, the School of Medicine has successfully implemented online testing as part of its educational program. The Medical School has accomplished this for 175 students throughout its curriculum. The

experience of the Medical School in the application of this technology will be very beneficial to the School of Dentistry in planning and implementing a more broad based online testing function.

The applications for web-based and digital technology in dental school seem limitless. “Educators see the advantages of using this technology not only as a vital support to making dental education more efficient and effective but an important tool that students can bring to the community as a General Practitioner.”

The implementation of any new technology can also present challenges – to some extent the electronic curriculum has been viewed as being a novelty. There is a reluctance to change and more evidence is needed to measure the impact on student’s ability to learn. As more schools are becoming involved, however, the issues for successful implementation are being better defined and thus can be addressed in advance. Training for faculty and students is important, the software itself has been improved, and the technology knowledge of in-coming students is increasing. In fact, in many instances students are coming from undergraduate campuses that have implemented widespread electronic/computer technology (wireless, Blackboard etc.).

The results of a survey of current dental curricula reported in September 2004 in the Journal of Dental Education indicated that 86% of the schools who responded have expanded the use of instructional technology and most schools have plans for additional future expansion. The most frequently selected curriculum innovation of the past three years was “increased use of computer based technology.”

Another application of computer technology in dental education has been in the dental histology curriculum. The use of microscopes to view slides has been the traditional approach to teaching the laboratory component of general and oral histology. In some cases (that reported by MacPherson) 35mm slide sets had been created. However, this was also a restrictive and a non-interactive format for the lab. Digitizing the slides, creating a user interface and incorporating the slides into modules (digital laboratory) was introduced to better present the material in an interactive and stimulating manner, increase student access and make the study materials more informative. In the results of MacPherson’s study, he reports that the computer-based laboratories have several advantages – among the most important being increased access to materials thus facilitating individual learning styles. The students reported that they felt this format was more time-effective for assimilating information. Since the time of this study, another dental school has developed a virtual microscopy slide package and VitalSource has a slide package as part of their digital library.

Network/Web Applications LSUSD has a network application software for test scoring (PARSCORE), test design and item banking (PARTEST) and online test administration (PARTEST ON-LINE). To date the online component has been used primarily for administration of mock National Board Dental Exams. This is an important aspect because the National Board Dental Examination Part II is administered online and

there are plans to administer Part I online. At present both can still be taken in paper format, however, this may change in the future.

The courses in biostatistics for the dental and dental hygiene students were administered online using Sharepoint™ in the 2004-2005 academic year. The students received the course information, completed assignments, and quizzes online. Components of basic science courses including anatomy and physiology have been provided in an interactive digital format.

As the amount of digital information has increased and with the concomitant need for the students to have ready access to this digital information in many aspects of their educational process (classroom, laboratory and clinical), LSUHSC School of Dentistry has developed a plan to enhance the current platform.

The Computer Services department has been investigating increased computing needs resulting from the use of student laptops. The classroom that will be used for the freshman courses has been upgraded with network connectivity and power supply to accommodate all of the students in the classroom. An additional switch has been included to support network connectivity speed. Logons for online testing will be staggered in a process similar to that used with the medical students to accommodate the network connections.

Wireless connectivity is being added at several locations throughout the school. The student laptops are being equipped with a DVD writer so that the students can download and save information for use at home and not have to rely solely on internet connectivity from off-campus.

The dental school has been using 10 Megabit fiber NMLI running at Half Duplex that is leased from BellSouth for the past 10 years. NMLI is old technology and the more current technology is Metro Ethernet. If needed, our current line could be easily converted over to Metro Ethernet providing us with 50 Mb/Sec, 100 Mb/Sec, or 1 GB p/sec speeds. The monthly cost will not be much more that what is being paid for now but would increase speed dramatically.

Alternative Approaches

Over the past several years, the Dental School Curriculum Committee has investigated the use of other educational technologies such as Blackboard. Several meetings and workshops were held with representatives from the Board of Regents and other institutions to investigate and demonstrate the application of Blackboard. After careful consideration, the committee decided that the cost of implementation was too great for the dental school to pursue this course independently. Subsequently, the implementation of Sharepoint (Microsoft) through the current network has provided the means for sharing educational information and hosting the curriculum content for student and faculty access.

The School of Dentistry has continued and will continue to implement SharePoint and faculty members have increased the amount of material available electronically. Faculty members have received and students will receive additional training in its use. The dental school continues to work with the Health Sciences Center for the possible implementation of BlackBoard. The Board of Regents is aware of and supports the Health Sciences Center's interest in an Enterprise license for BlackBoard.

The achievement of laptops with the digital/electronic library would be the next step in enhancing computer-based, portable, and widespread access to the curricular and educational materials.

Committee Activity Related to the Plan

The Subcommittee on Information Technology held its first meeting on April 29, 2004. The Subcommittee on Information Technology is a subcommittee of the Strategic Planning Committee. The charge is to develop goals and action plans for enhancing the educational programs with information technology and to establish prioritization of needs to facilitate incorporation of information technology. A substantial amount of work has already been done by the curriculum committee concerning the implementation of additional technology, but there are other areas that need to be addressed. There were representatives from Central Computer Services of the Health Sciences Center and a representative from Microsystems, a unit of Auxiliary Enterprises, who had been involved in the laptop program for the Medical School and provided information for consideration for implementation of laptops at the Dental School. There was also student representation on the committee. The committee developed a plan and recommendations concerning academic computing that were brought to the Strategic Planning Committee. A recommendation was made to develop Room 8401-D into a technology-supported classroom. The recommendation was forwarded to the Strategic Planning Committee for consideration.

- The Subcommittee on Information Technology in coordination with the larger Strategic Planning Committee and the Curriculum Committee hosted an LSUHSC School of Dentistry Technology Day on June 3, 2004. (Mr. Mark Platt, the Assistant Director of Data Processing at LSUHSC Shreveport spoke on the use of laptop computers in the curriculum.)
- The Strategic Planning Committee met on June 17, 2004 and the recommendation of the Information Technology Committee was considered. It was recommended that the Information Technology committee develop a plan focused on the implementation of Sharepoint this year and digitization of the curriculum and planning for implementation of a laptop program next year.
- The Curriculum Committee met on August 20, 2004 and set the following major goal for 2005-2006: "To further enhance the educational programs by incorporating electronic learning modalities, more specifically through the following actions."
 - Requiring laptop computers for all first and second-year dental students

- Creating a classroom to seat a full complement dental class with computer accessibility
- Redesigning the library to include wireless and wired computer accessibility in a more relaxed atmosphere conducive to both individual and multiple-person study groups
- Purchasing and implementing the Vital Source Technologies, Inc. textbook package [*digital library*] for the dental curriculum
- The Curriculum Committee received (August 25, 2004) the proposal to upgrade the School of Dentistry's telecommunications infrastructure, as requested of the Network Support Services of LSUHSC-NO
- The LSUSD Faculty Retreat was held on October 14-15, 2004. Ms. Sharon Grayden and Ms. Melissa Miskiewicz gave a presentation on *The Use of Laptops in Dental Education and On-line Textbook Programs (Vitalbook)*.
- The Ad Hoc Committee for the Renovation of Auditorium B met on Oct 28, 2004 to hear a presentation by an architectural firm on the redesign of the room. The plan of this committee includes hardwiring the room for power and network connectivity.

All of the information from the committee meetings – minutes and supportive documents have been posted on Sharepoint for review by faculty, students, and staff. In order to address the recommendations of these committees the following proposal is being offered.

Enhancement Plan

LSUHSC School of Dentistry is proposing a laptop computer and digital library requirement for all first-year dental students effective academic year 2005-2006. This proposal addresses both the School of Dentistry Strategic Plan, 2002-2005 and the LSU Health Sciences Center in New Orleans Strategic Plan, which can found at <http://www.lsuhs.edu/no/administration/strategicplan/>. The LSUSD Strategic Plan, found at http://www.lsusd.lsuhs.edu/about/strategic_plan.htm, includes the goal for Education: Enhance the curriculum by applying innovative approaches to dental education with the related objective of incorporating electronic learning modalities into the educational programs. There is also a relevant Goal in Resources: Increase the use of state-of -the- art technology to enhance programs and services of the School of Dentistry with its related objective, develop a mechanism to support implementation of enhanced technology. The LSUHSC-NO Strategic Plan also has a goal that addresses the concept in this proposal: Promote innovation and improvement in the curriculum of each school and program, new technology and state of the art teaching techniques for excellence in education. If accepted, the School of Dentistry would be the first program in the LSU Health Sciences Center in New Orleans and in the LSU System to implement a complete online textbook program.

Faculty and Student Support for Computer Infrastructure

The School of Dentistry has been investigating various technologies to enhance the dental curriculum for the past three years. The Curriculum Committee began the process in 2002 and, since that time, the committee has garnered widespread and broad-based support for this program. Institutional buy-in is demonstrated through support from the Strategic Planning Committee, Subcommittee on Information Technology and the Technology Fee Oversight Committee. Student members of the Curriculum and Strategic Planning Committees, as well as the Subcommittee on Information Technology, have been very vocal in expressing support for this proposal. Individual meetings of the current first, second and third-year dental classes have shown enthusiastic support for the proposal. Second and third-year class presidents independently polled the members of their respective classes and overwhelming support has been documented. It is important to state that the above committees support this proposal with the understanding that additional manpower support for the Office of Computer Services will be acquired to support the laptop program. The Faculty Assembly approved the approach in concept at their meeting on January 11, 2004. The information was presented to the faculty at a General Faculty Meeting and to the Administrative Council on January 13 2004 and approved.

Network, Hardware, and Applications

Informatics requires a synergy of network, computer hardware, applications, and people. All four components are crucial for success. In November 2004, wireless connectivity was provided from the School of Dentistry Library and the Tiger Café allowing students and faculty the ability to access school resources such as Sharepoint and e-mail, and to use the internet for personal tasks outside of the classroom setting. The implementation of Sharepoint has also provided a mechanism through its survey function for the administration of course evaluations in electronic format. The current computer laboratory, wireless connectivity, and access to the school network from home allow students a more flexible approach to completing the evaluations (and to other computer information). The students having their own laptops would further enhance this flexibility. They would also make the electronic course materials and other forms of electronic communication much more accessible. The school has benefited from the experiences of peer institutions in expanding computer access through laptops and has aggressively sought their council. The following plan reflects the best ideas from this research.

Three Phase Initial Plan

The initial plan for this informatics implementation will take three years. At the end of this implementation, the school anticipates that it will have created an infrastructure that is consistent with the best practices of peer institutions, will be easily maintainable and upgradeable, and will constantly be renewed as subsequent classes bring the latest hardware.

Phase 1 (Year 1) is the most aggressive and important. It has been a mistake at many of our peer institutions to look at such implementations from the laptop aspect first. The laptop is the most visible component of this plan, but is probably the least institutionally demanding component. Network and informatics support are the first priority in Phase 1.

First, the school intends to hire a User Support Analyst who will be responsible for working with students and faculty on hardware, application, and network issues. The school believes that this hire is crucial to the success of any informatics implementation. There will be much concern and insecurity among faculty and students who will perceive this new requirement a stressful and “different from the status quo.” Having a person who is the contact for issues will be a comfort during the transition years.

Second, the school will begin a school-wide computer network upgrade with switch and wiring upgrades on the fifth and eighth floors. During the first year program, students rely on these floors for a majority of lecture and lab experiences.

Third, the first year classrooms will be fitted with appropriate power access and network access points to facilitate student and faculty laptops. While the laptops do have batteries, information from other institutions informs our decision for 1-to-1 power access to allow the students to use batteries in non-powered rooms.

Fourth, the students will be required to have a standard laptop computer. Standardizing the platform is preferable from a standpoint of support. The school can maintain extra machines in the event of individual hardware failure and, it allows the school to maximize purchasing power on the student’s behalf. The machines will come preloaded with a suite of email, word-processing, spreadsheet, and presentation applications. Training will be provided.

Fifth, the students will be required to purchase a license to a library of digital content specifically designed by the school for their curriculum. Vital Source Technologies, Inc. (www.vitalsource.com) provides similar custom libraries to 10 dental schools in the United States. The digital library is flexible, customizable, and represents all of the basic content sources the support the school’s full four-year curriculum.

Sixth, in conjunction with the implementation of the laptop computer requirement, the histology laboratory component is being changed to a virtual microscopy laboratory. In order to accomplish this conversion, the School of Dentistry is also requiring the first year students to purchase a virtual microscopy slide package. This will be a part of the Anatomy Module that includes gross anatomy, general and oral histology, neuroanatomy, and aspects of embryology.

One of the challenges in health science curriculum is the study of microscopic anatomy. Oral anatomy and oral pathology are particularly difficult for dental students. The understanding of normal histology is later referenced in pathology courses. Thus, consistent access to these slides and their descriptions is a focus of our initial materials for the students in the digital library. Radiology and microscopy have been traditionally

difficult areas in the migration to digital technologies. For radiology, there are professional societies working for a seamless diagnostic transition from film to screen; however, microscopy has had many working groups over 20 years. The problems have surrounded color consistency and resolution. Two years ago, the school began working with peer institutions that were working with high resolution scans and viewing applications that mimic the microscope experience. Current thought in dental curricula is that physical microscope use by dental students is no longer required, and the school's experience is that maintenance of microscopes has become difficult.

The school has worked with Vital Source Technologies and University of North Carolina School of Medicine to build a prototype "Virtual Microscope" document that uses the basic VitalBook™ format with the MrSID™ microscopy viewer to build a manual suitable for replacement of general histology, oral histology, general pathology, and oral pathology slide sets. The anatomy module course director has worked with the prototype for 8 months and feels that it will be suitable for student understanding of the individual slide content as well as being an integrated portable resource between courses that use microscopic content. The document will continue to evolve to include additional slides as needs present themselves. This will allow for a collaborative relationship with peer institutions who would like to make this document a multi-institutional asset.

Phase 2 (Year 2) continues the upgrade to the institutional infrastructure and provides connectivity as freshmen move into their second year studies.

First, the previous network improvements will be afforded to the sixth floor.

Second, second year classrooms will be fitted for power and network points of access.

Third, power and network upgrades will be provided to the fourth floor and Auditorium B.

Fourth, the renovation of Auditorium B is being planned in conjunction with Continuing Education.

Fifth, the laptop requirement will continue for the 2006-2007 incoming first year class.

Phase 3 (Year 3) With the renovation of Auditorium B and its hard wired network connectivity, the capacity for an expanded online testing process implemented with the laptops would be available. The design of the Auditorium would allow for appropriate security and have sufficient ports to accommodate an entire class. Because the space in the current computer lab (18 desktop computers) does not allow an entire class to be tested at one time, the opportunities for doing online testing have been limited.

First, with the use of student laptop computers online testing will be implemented.

Second, it is possible that the implementation of the online testing will require new testing software or upgrade to the current software.

Third, the application of computer technology in the clinical setting will also be incorporated in the third phase. As this technology is becoming more incorporated in modern dental practice, it is essential that students gain this experience while in school. The process will begin with the purchase of a new clinic information system to meet future needs of student clinics.

The School of Dentistry has been in contact the Virginia Commonwealth University School of Dentistry, which has recently implemented a new clinic management system including electronic patient records and digital imaging. That school is providing consultation to LSUSD on issues related to implementation, including costs. Based on the information shared to date the cost estimates provided in the QEP appear to be adequate. At the present time, LSUSD is testing the WINDENT clinic management system and this is the system that the school with which we are consulting ultimately purchased and implemented.

The computing needs related to clinic and patient management are being considered separately from academic applications. Clinic applications are under the purview of the Director of Clinic Education and the Clinic Committee. All patient related material is protected by HIPAA. At the present time, the Patient system QSI has its own logons and is not the central network logon. The QSI is a separate UNIX system completely independent of our servers. Any future patient management system would be managed in a similar format.

All faculty, staff, and students who have access to patient information receive mandatory training on HIPAA compliance and the appropriate use of computers.

Fourth, there will also be renovation of the student clinic areas to provide infrastructure for the incorporation of computer technology in the clinic operatories. This will include wiring and purchase of digital radiography equipment and electronic charting software. The laptop will be a vital component for most effective utilization of electronic charting.

Assessment and Evaluation Plan

Assessment data pertaining to the Laptop Computer and Digital Library Requirement was obtained from other schools that have implemented this requirement. These schools indicated that they used focus groups during the year to gather information from the students. We have used this is the planning process (in the evaluation of a new course this year) and feel that it would be a good format for formative evaluation of the laptop project.

There are several types of data to be gathered – information about the students’ prior history with computers and electronic learning, specific information about the functioning of the software, how they use it, if they use it, is it helpful and how it is incorporated into their classes.

Performance in the dental courses and performance on the National Dental Board Examinations will be considered assessments. Information concerning use of the textbooks will also be assessed in course evaluations. In the more long term whether or not the students continue to use the library after graduation and how they see its benefit following the completion of their dental education are also important factors – whether this kind of program support the development of lifelong learning.

Formative and summative (end of academic year) assessments will be conducted to evaluate the progress and success of the laptop computer and digital library requirement. These assessments will address issues to include factors recognized as potential concerns from other institutions that have implemented digital curriculum solutions.

- Skill level of incoming students
- Need for printing the textbook information
- Level of comfort with on-screen reading
- Desire to have notes provided/taken in paper format
- Arrangement of lecture hall not convenient for laptop usage
- Battery life of laptop – need for recharging
- Technical issues related to electronic medium
- Degree of integration of digital/electronic library into courses
- Student performance on National Board Dental Examinations

These ongoing assessments will help with application and hardware choices well beyond the first 3 years of the project. Just as the school continues to evaluate our physical plant and clinical equipment, the school recognizes that computer infrastructure is an asset that requires continuous attention, upgrading, and refinement.

The Health Sciences Center also conducts surveys on student satisfaction with many areas of academic life. Questions could be included to address satisfaction with the use of laptops, the computer labs and instruction, the effectiveness of computer support and repair or loaner capability for laptops, access to e-mail both at school and remotely, interface with the electronic resources of the library, computer based testing, use of simulation and the use of virtual microscopy. The data collected from all the Health Science Center schools are shared with each school both as individual and collective results for comparative purposes.

Project Funding

This project proposes funding from institutional and student sources. Some of the costs are reallocation of existing funds and some are new capital expenditures.

Network and Power Start-up funding (\$92,604) has been committed to upgrade the network infrastructure, which will include new wiring, switches, and maintenance for the

first-year of the project. The Technology Fee Oversight Committee (the Technology Fee Oversight Committee has student representation) approved the allocation of funding (\$52,744) to support the network infrastructure upgrade, with the remainder being funded by the School of Dentistry. Plans for the first-year of the project include completion of the upgrade of the eighth floor infrastructure and the fifth floor Computer Center (Clinic Building). These plans are essential to support the anticipated network connected classroom, which would accommodate a full-complement dental-class connection. It is estimated that an appropriation of \$10,000-\$15,000 would allow for the wiring and switch needed for connectivity to Room 8401-D, thus satisfying the need for a fully connected classroom. In addition, this initial upgrade will enhance network performance and provide the ability to expand port capacity and allow for implementation of future technological programs and access (Phase II). Consideration will be given to arranging network connectivity in additional areas, more specifically the 3rd and 4th floor (Administration Building) to support access in Auditorium B and the library. In addition, consideration will be given to establishing power and connectivity to an additional classroom (6409 – Clinic Building) to prepare for the second-year of the program, which will include two classes of dental students using the digital/electronic curriculum.

Laptop Computer The School of Dentistry Office of Computer Services, along with members of the Curriculum Committee, other faculty members and students, have considered and tested various computers and have proposed the required purchase of the Dell Latitude D600, Pentium M 755 with Windows XP computer, wireless and wire-ready. The estimated cost for each of the 60 (first-year dental class) students is \$2000 per student laptop. The ‘actual’ increase in student fees for the addition of the laptop may be reduced proportional to the additional laptop computers purchased. The laptop purchase will be made available to current dental students and faculty.

Digital Library The School of Dentistry proposes contracting with Vital Source Technologies, Inc., the sole source of a digital/electronic dental textbook program, to purchase a VitalSource digital library for the dental curriculum. The interactive digital library would include all currently required textbooks for the four-year dental curriculum as well as an additional dental textbook library of approximately 60 titles. The total cost of required hard-copy individual textbooks for academic year 2004-2005 totaled \$2365.00. The cost of the digital library would be equally appropriated across the four-year program resulting in the cost of approximately \$870 per student per year for a total of \$3480.00.

When the students graduate, they would own this library in perpetuity. The students would receive any new editions of textbooks while they are in school. After graduation, they would be eligible for updates for a fee. The School of Dentistry has consulted with schools of dentistry currently employing this program and held Faculty Retreat in October 2004 that included presentations on the VitalSource digital library by representatives from the University of North Carolina and the State University of New York at Buffalo. VitalBook™: Digital Library is from Vital Source Technologies, Inc., which was founded by a dentist faculty-member at The University of Texas Health Science Center at San Antonio. Following 10 years of research into e-book and e-

reference technology, in the Fall Semester 2000, VitalSource implemented customized digital dental libraries at University of Texas Health Science Center at San Antonio, the University at Buffalo, University of Medicine and Dentistry of New Jersey, New York University, and Boston University. LSUHSC has been following the progress of these implementations and the upgrades in the core library technologies. It is the consensus of our committees that VitalBook™ provides a platform with the following benefits.

- Supports less linear and more collaborative learning by making it easy for students and faculty to access related content from numerous sources
- Allows multi-dimensional content searching that promotes critical thinking and exploration as the software tools provide such powerful searching capabilities
- Allows students to build linked study guides
- Is omnipresent and portable – allowing access to information at anytime, from anywhere, throughout dental school and beyond and in any clinical environment as well
- Includes all faculty-required textbooks
- Resolves copyright issues and provides faculty with a tremendous resource to integrate into teaching
- Prepares students for practice in an ever-increasing technologically based world
- Offers a life-time reference library that can be augmented as content needs change
- Supports the LSU Health Sciences Center in developing its image as a leader in technology implementation in education

Virtual Microscopy The School of Dentistry proposes contracting with Vital Source Technologies and perhaps the University of North Carolina for the Virtual Microscopy slide package. This will either be in the Vital Book format or include the MrSID™ technology. The estimated cost to the students of this package is approximately \$20 per student. The virtual microscopy is considered an important component for the new anatomy module.

The course directors for the courses that will be using the virtual microscopy have been in contact with and are working with the faculty member who began implementation of the virtual microscopy at the Medical School. The slides that are already available in digital format, necessary software and scanning equipment have been investigated. All that is necessary for the production of digital microscopy for the dental school is available and will be completed for the histology course.

In addition to the digital textbook library, the students have a variety of online materials available to them. A number of instructors have included links to supplemental course information on their course sites on Sharepoint (for example Digital radiography), there is an online drug database developed by Lexi-Comp™ offering access to databases and modules and numerous electronic resources through the dental library. All of these digital resources are provided to enhance student learning.

With the use of the materials that have been developed through the LSUHSC School of Medicine the faculty should be able to accomplish the virtual microscopy component without additional cost to the student.

Summary of Costs

Student 'textbook fees' will be increased to include the purchase of the laptop computer (\$2000) and the digital/electronic dental textbook program (\$3480) and will be reduced by the current (2004-2005) textbook fee of \$2400.00, resulting in a total (four-year) net increase of approximately \$2080.00. Only first-year dental students will experience the increase in 2005-2006 and the increase for this group will be \$2870 for that academic year and an additional \$870 for each of the remaining three years in the dental program. In addition, a fee of approximately \$20 per student will be incurred to cover the cost of the virtual microscopy slide package.

Dental Students in the Simulation Laboratory



Timeline

Spring 2005

Implementation of the digital/electronic dental textbook program will include the following.

1. Obtaining necessary approval from institutional administration and boards
2. Completing the agreement with VitalSource
3. Notifying incoming students of laptops and digital library requirement
4. Advertising and for and hiring the User Support Analyst
5. Loading the digital/electronic library on to appropriate course director and faculty computers with appropriate training
6. Purchasing laptops
7. Pre-loading the digital/electronic library onto each student laptop computer prior to the first day of class, 2005-2006
8. Completing network and hardware upgrades
9. Scheduling time for training in first year curriculum
10. Establishing the financial aid process
11. Working with course directors to identify needed images for the virtual microscopy slide package
12. Identifying virtual microscopy slide package sources for use in the anatomy module

Summer 2005

1. Providing first-year student training sessions for use of the digital/electronic textbook program
2. Incorporating virtual microscopy package in Anatomy Module

Fall and Winter 2005

1. Scheduling feedback sessions throughout the year to assist with content choices and “best practices” integration into the curriculum for subsequent year implementations
2. Preparing for 2006-2007 first year class
3. Beginning upgrade of 6th floor infrastructure and classroom
4. Considering modifications based on experiences during first year

Budget Year 1	
User Support Analyst – computer support to assist with laptops, student, and faculty questions.	\$40,000 + 25% fringe benefits
Technology Infrastructure – 8 th floor upgrades to the network, wiring, and switches. Includes enhancements to the central support of computer services on the fifth floor	\$92,604
Upgrade to 8 th floor classroom with power and connectivity for laptops	\$15,000
Training for faculty in use of the digital/electronic library (faculty to serve as trainers)	\$2,000
Laptops – specs by computer services – paid for by students through financial aid	\$2000 per laptop
VitalSource Digital Library –paid for by students (in conjunction with financial aid)	\$3480/\$870 per year
Consultant for development and application	\$1500 (continuing through school funds)
Virtual Microscopy slide package	\$20/student
Budget Year 2	
Technology Infrastructure – upgrades to network for the 6 th floor	Approximately \$100,000
Upgrade to classroom on the 6 th floor to accommodate 2 nd year students with laptops	\$15,000
Upgrade to technology infrastructure 4 th floor and renovation of Auditorium B	\$500,000 + (funds to be secured in conjunction with Continuing Education)
Budget Year 3 and Beyond	
Renovation of Auditorium A including technology upgrade	\$500,000
New Clinic Information Management System with Windows capability	\$350,000
Digital radiography and electronic charting in student clinic	\$750,000

Web-Based Learning: Current Protocols Online

Background

Traditionally, graduate students acquired research protocols through direct laboratory experience. If techniques were unavailable in the student's laboratory or school, they had to search the literature or visit laboratories at different institutions to learn new methods. With the rapid development of molecular biology and the increasing multidisciplinary nature of biomedical research, the number of new protocols has rapidly increased. The Graduate Student Council identified the need to make new and classic protocols easily available to students. After several months of study, they identified a solution upon which this plan is based.

Enhancement Plan

The goal of this enhancement plan is to provide all graduate students at LSUHSC-NO access to Current Protocols Online at the John Wiley & Sons website located at <http://www3.interscience.wiley.com/aboutus/>.

Current Protocols Online is a diverse collection of laboratory methods and techniques written by the scientists who use those methods, and is designed to meet the needs of both the beginning investigator, as well as those who are experienced but are expanding their research by using new methods. Current Protocols Online are detailed guides that contain material lists, step-by-step procedures, annotations, illustrations, and commentaries that help scientists with the successful completion of a method. Graduate students will be able to download and open protocols on computers as PDF or HTML files and print or save to computer or CD disk.

Access to Current Protocols Online will aid graduate students at LSU Health Sciences Center in New Orleans their scientific research by giving them background information and understanding of laboratory methods and techniques. Furthermore, knowing and understanding laboratory methods from Current Protocols will give graduate students insight and knowledge in designing and planning their experiments as well as learning to troubleshoot when experiments fail.

The Current Protocol Titles will be set up and operated through the LSUHSC Library effective Spring 2005. Furthermore, the seven Current Protocol Titles will only be available to students, faculty, post-docs, and staff at LSUHSC in New Orleans. Access to current Protocol Titles will be made available on-campus with an LSUHSC-domain or off-campus via WAM (Web Access Management) through the library web page. Furthermore, protocols can be downloaded and opened on computers as PDF or HTML files and printed or saved to computers or CD disks. The Isché Library has agreed to

sponsor classes for students in the use of the database. Effective Fall 2005, all new graduate students will be required to attend such a class.

Project Funding

Currently, Wiley & Sons sells licenses to institutions like LSUHSC, based on their full time equivalents (FTE), which include students, faculty, and post-docs. The current FTE for LSUHSC is 3,400. The majority of the Graduate School student body at LSUHSC decided to use the Student Technology Fee money, described below, on Current Protocol Titles in Molecular Biology, Cell Biology, Protein Science, Immunology, and Pharmacology. Current Protocol Titles in Human Genetics and Neuroscience would be purchased by the Health Sciences Center Library and the Neuroscience Center, respectively.

<u>Protocol Titles</u>	<u>Cost</u>
Molecular Biology	\$2,340
Cell Biology	\$1,755
Protein Science	\$1,755
Immunology	\$1,955
Pharmacology	\$1,755
Human Genetics	\$1,755 (LSUHSC Library)
Neuroscience	\$1,755 (Neuroscience Center)
Total	\$13,070.00
Total With 15% Discount	\$11,109.50
Neuroscience Will Pay	\$1,491.75
Library Will Pay	\$1,491.75
Graduate Student Technology Fee Will Pay	\$8,126.00

The Graduate Student Council decided to purchase the seven Current Protocols as indicated above for three years with a 5.5% cap on any future increase in prices. Molecular Biology, Cell Biology, Protein Science, Immunology, and Pharmacology would be purchased with the Technology Fee money, and the Library and the Neuroscience Center would purchase Current Protocol Titles in Human Genetics and Neuroscience, respectively.

Authorization and Administration of the Student Technology Fee

The Student Technology Fee at Louisiana State University Health Sciences Center is dedicated to the acquisition, installation, maintenance, and intelligent use of state-of-the-art technology solely for the purpose of supporting and enhancing student life and learning and of preparing graduates for the workplaces of the twenty-first century. The term “technology” or “technologies” in this document denotes computer hardware and software (and the networking and supporting computer and telecommunications

infrastructure), laboratory instruments, and discipline-specific equipment, including, but not limited to, such items as scales, pipettes, centrifuges, electrophoresis equipment, and microscopes. The student technology fee collected from graduate students over the past three years has accumulated to \$31,056.50.

The Student Technology Fee funds are supplemental to currently allocated funds for technology. The fee is five dollars (\$5) per credit hour for up to 15 semester credit hours per semester, and no fee is charged to an individual student during a given semester for semester credit hours in excess of 15. An eleven-member committee chaired by Dr. Joseph M. Moerschbaeher, Dean of the School of Graduate Studies oversees the Student Technology Fee Program. Other committee members include, Dr. Kathleen McDonough, Associate Dean of Graduate Studies and student representatives from each of the Graduate School programs, which include Biochemistry and Molecular Biology, Biostatistics, Cell Biology and Anatomy, Genetics, Microbiology, Immunology and Parasitology, Neuroscience, Pathology, Pharmacology and Experimental Therapeutics, and Physiology.

Proposals for use of the Student Technology Fee must specify which of the goals and objectives of the Student Technology Fee Plan would be advanced were the proposal to be implemented. Each proposal must also specify the primary and secondary beneficiaries among the student population. The Student Technology Fee Oversight Committee has exclusive responsibility for recommending to the Dean the approval or disapproval of specific proposals.

Strategic Goal of the Student Technology Fee Program

- | | |
|-------------|--|
| Goal | To provide students with access to, and training in, information technology and discipline-specific equipment that represents the current state of the art. |
| Objective 1 | To provide public access computers with up-to-date software as well as network and Internet connections in a ratio of no less than one for every ten students |
| Objective 2 | To provide state-of-the-art multi-media classrooms in no less than 50% of the general use classrooms on campus (the term “multi-media classrooms” does not necessarily denote online network connections at every classroom seat, but instead denotes the most appropriate instructional technologies for particular classrooms) |
| Objective 3 | To ensure that instructional laboratories and studios are equipped with the most current equipment appropriate to teaching and learning in the various disciplines of the Health Sciences Center |
| Objective 4 | To provide appropriate state-of-the-art technology to student services that directly support student life and learning. |

Assessment and Evaluation Plan

Assessment of the effectiveness and use of the database will be made over the five-year period of the contract. Data will be collected monitoring usage by protocol title, along with semester-based surveys on student usage and satisfaction. Longitudinal data will also be collected in order to determine how student usage may change over the course of their career. For example, will students use the protocols more frequently early in their education, or later on, when they become more sophisticated as young scientists?

In addition to assessing student satisfaction and utilization records, we plan on evaluating the educational merit of this technology using the following outcome measurements.

- We will survey lab mentors both before and after implementation of the Current Protocols to determine if the Protocols have facilitated learning in the laboratory environment.
- We will also ask the mentors to evaluate student efficiency in relation to the development of new protocols in order to determine if they have improved the students' time-management. It is anticipated that the use of Current Protocols should decrease the time required for the development of new techniques.
- We will also survey the students in relation to the number of times they refer other students or technicians to Current Protocols. This measurement should reflect, in part, the student's perception of the Protocols relative value. Finally, as part of our ongoing course evaluations we will add a question(s) to determine the frequency that Current Protocols are consulted as part of the student's course work rather than a research requirement. It will be useful to determine if the Protocols are perceived to be of assistance to the students in understanding a technique that is described in a didactic context but not actually implemented.

LSUHSC-NO Students in a Nursing Computer Lab



The Relationship of the Quality Enhancement Plan to the LSHSC-NO Strategic Plan

Focus – Development and Effectiveness of Instructional Technology

New Orleans Quality Enhancement Plan	Strategic Plan of LSUHSC in New Orleans http://www.lsuhs.edu/no/administration/strategicplan/
Patient Simulators	<p>Goal 2 Advance the continuing comprehensive missions by identifying and addressing the basic <u>infrastructure</u> that are necessary to sustain the advancement and dissemination of knowledge</p> <p>Goal 4 Promote education and improvement in the curriculum of each school and program, <u>new technology, and the-state-of-the-art teaching techniques</u> for excellence in education</p>
Web-Based Learning	<p>Goal 17 Participate in planning and explore avenues of intervention and collaboration to implement definite new endeavors for outreach in education service</p>

Institution Wide Assessment of the Quality Enhancement Plan

Assessment requires attention to outcomes but also to the experiences that lead to those outcomes. Information about outcomes is essential, but to improve outcomes, LSUHSC-NO needs to know about the entire educational experience – about the curricula, teaching, and kind of student effort that lead to particular outcomes. Assessment alone changes little; it must be tied to decision making. Its greatest contribution comes on campuses where the quality of teaching and learning is valued and promoted. At LSUHSC-NO, the push to improve educational performance is a visible and primary goal of leadership. Improving the quality of professional education is central to the strategic planning effort; and information about learning outcomes is an integral part of decision-making.

In addition to the individual assessment activities described above we plan to assess student satisfaction with technology in all students in the Schools affected by the Quality Enhancement Plan. Each year we administer a Louisiana Board of Regents/ACT Student Satisfaction Survey. This survey is supported by the Board of Regents and is conducted at all public institutions of higher education in the state. The Survey measures students' satisfaction with college services such as library facilities and student health and satisfaction with the college environment, for example class size, testing and grading system, and course content.

The report was expanded in 2004 to include a graphic report, summary data, statistical data, and breakdowns by each school on each campus. In 2005, we will have the opportunity to include fifty "custom" questions, which will be used to assess student satisfaction with new technology and instruction. These same questions will thus become an important assessment component of our Quality Enhancement Plan.

Examples of the ACT Survey questions for the technology component would include satisfaction with the following.

- Use of and availability of PC's, laptops
- Computer labs/instruction
- Computer support/maintenance/repair/loaners
- E-mail service at school and remote locations
- Search/interface with library/MD consult/Ovid etc.
- Computer based testing
- Use of/instruction in non-computer clinical technology-EEG, ECG, ventilators, monitors, etc.
- Use of simulators
- Use of computers in virtual microscopy

The ACT Survey provides graphical information for selected demographic items (e.g., age, race/ethnicity, sex) for LSUHSC-NO and for a national normative sample. For all Likert scale items (e.g., 5-point Satisfaction scale), data are displayed the Health Sciences Center's top and bottom five items as well as the five items with the greatest and least differences for LSUHSC-NO in comparison with national normative data. The "National Norms" used in the ACT are currently based on 56,418 student records from 68 public postsecondary institutions that administered the ACT Student Opinion Survey between January 1, 2001 and December 31, 2003. Normative data of this type are often referred to as "user norms" because they simply represent a composite of the data obtained by a number of institutions that administered the instrument during a particular period-of-time.

The information about our students' opinions will be distributed to the Planning Implementation Committee, and the administrations and curriculum committees of each of the schools in the Health Sciences Center.

References

Chaves JF and Lantz MS. Educating the next generation of dentists. J Indiana Dent Assoc 2001 Summer; 80 (2):10-5.

Dental Education at the Crossroads – Summary. J Dent Ed 1995 59(1):7-15.

Ericson, KA. Deliberate Practice and the Acquisition and Maintenance of Expert Performance in Medicine and Related Domains: 2003 Invited Address. Academic Medicine 79(10):S70-S81, 2004.

Field MJ. ed. Dental education at the crossroads: challenges and change. Washington, DC: National Academy Press, 1995.

Fried, GM, Feldman, LS, Vassilou, MC, et. Al. Proving the Value of Simulation in Laparoscopic Surgery. Annals of Surgery 240(3):518-528, 2004.

Groopman, J. How Simulators are changing the way doctors are trained. The New Yorker Issue of 2005-5-02.

Hendricson WD and Cohen PA. Oral health care in the 21st century: implications for dental and medical education. Acad Med 2001 Dec;76(12):1181-206

Howell, W. L.J. Building Bridges between Health Professions. AAMC Reporter 2005, 14 2005, 6-7.

Kassebaum DK, Hendricson WD, Taft T and Haden K. The dental curriculum in North American dental institutions in 2003-03: a survey of current structure, recent innovations, and planned changes. J Dent Ed 2004 68(9):914-931.

Kneebone, R. Evaluating Clinical Simulations for Learning Procedural Skills: A Theory-Based Approach. Academic Medicine 2005, 80:549-553.

Lindberg, D. A.B. and Humphreys, B. L. 2015-The Future of Medical Libraries. New England Journal of Medicine 2005, 352:1067-1070.

MacPherson BR and Brueckner JK. Enhancing the dental histology curriculum using computer technology. J Dent Ed 2003 67(3): 359-365.

Schlossberg M. DE 2.0 From Digitized Textbooks to Emphasis on Treating the Underserved. AGD Impact 2003 November 10-3.

Wong, AK. Full Scale Computer Simulators in Anesthesia Training and Evaluation. Canadian Journal of Anesthesia 51:455-464, 2004.