“Learning in a Technology-Rich Environment” (LITRE) is the focus of NC State’s quality enhancement plan. Consistent with the University’s mission “to create an innovative learning environment” the LITRE plan brings a faculty-based, reflective perspective to the University’s strategic planning and policy making related to student learning and learning technology.

**Overarching Goals**

LITRE’s ultimate purpose is to improve student learning. LITRE’s primary strategy is to establish an ongoing, systematic investigation into the effectiveness of technology-based innovations to improve learning. We will use the results of these investigations to build on our successes, shape future investigations, and inform campus decision making.

In other words, the long-range, overarching goals for the LITRE project are:

1. ultimately, to improve student learning across the University through the use of technology. We will monitor the impact of those innovations on students’ abilities in four dimensions:
   a. problem solving,
   b. empirical inquiry,
   c. research from sources, and
   d. performance in the discipline.

2. to investigate systematically the effectiveness of technology-based innovations in learning and teaching. We will establish an ongoing mechanism to stimulate and study innovations.
3. to use the results of these investigations to scale our successes, shape future investigations, and inform campus decision making. More specifically, we want to
   a. increase student and faculty engagement with technology when shown to be effective in improving learning and teaching.
   b. develop appropriate, learning technology-friendly policies.
   c. improve the physical learning environment.

Details about implementation of these goals may be found in the LITRE plan (http://litre.ncsu.edu/pdf/litre_qep.pdf).

**Measuring Progress Toward Our Goals**
The appendix shows the additional information, including timeline and assigned responsibility, for each of the measurement strategies following each goal below.

1. **Improve student learning through the use of technology**
The LITRE plan identifies four dimensions of student learning to be enhanced with applications of technology. As described in the LITRE plan (page 53), these “Four Ways of Knowing and Doing” are as follows.

   a. **Problem solving**, including determining and evaluating possible solutions, and applying an appropriate solution to the problem

   b. **Empirical inquiry**, or discovering new knowledge through experimentation and other means, including choosing an appropriate research method; observation; organizing, analyzing, and presenting data; and reaching a conclusion

   c. **Research from sources**, or developing new information out of published sources (including books, journals, and articles from the library or Internet), including locating and critically evaluating sources, and marshaling evidence to answer a question

   d. **Performance**, or discipline-specific implementation

We will use this taxonomy to organize the campus discourse about learning with technology, at least initially. However, as with any ongoing investigation, we recognize that the “Four Ways” may evolve as our understanding grows.

Individual LITRE projects will measure student learning in one or more dimensions, as appropriate to the project. Principal investigators will use assessment tools crafted specifically for that project. Each project may address other aspects of student learning and the learning environment as well.
To measure the contributions of LITRE to student learning across the University, we will use the five measurement strategies below. The first three measurement strategies are university-wide and capture student and faculty opinions about the impact of technology on learning and teaching. The last two measurement strategies generalize from the results of the assessment of cognitive changes in student learning in specific learning conditions.

Measurement strategies:

a. *Survey Sophomores and Graduating Seniors:* Current surveys ask students about the three dimensions of problem solving, empirical inquiry, and performance, and about the use of technologies in their courses. We are adding questions about the fourth dimension (research from sources) and the effectiveness for their learning of various technologies inside and outside of the classroom.

b. *Survey Alumni:* The current survey asks alumni about NC State’s contributions to their problem solving skills and performance. When we prepare for the next administration of this survey in 2006-07, we will reevaluate questions related to empirical inquiry and research from sources to provide information more directly related to LITRE.

c. *Survey Faculty:* We will expand the LITRE Faculty Survey to ask faculty about how the teaching/learning technologies they use have affected student learning in the identified dimensions.

d. *Summarize LITRE Project Results:* Assessment results from individual LITRE projects will address one or more dimensions of student learning (see 1a-d on page 2 above) in specific learning situations inside and outside of the classroom. Each principal investigator will determine how the project addresses student learning, and will assess cognitive changes in student learning using assessment techniques tailored to the project.

LITRE’s Annual Report will summarize and reflect on the effectiveness of LITRE projects collectively in improving student learning in the four dimensions identified above.

e. *Learn from Reviews of Academic Program and Other Learning Technology Initiatives:* We will ask the Council on Undergraduate Education (responsible for general education), the Committee on Undergraduate Program Review, and the Graduate School (responsible for graduate program review) to summarize each year lessons learned by their review teams about the effective use of technology in teaching and learning in degree programs across the University. Furthermore, we will ask leaders heading up significant learning technology initiatives outside of LITRE to provide similar information.
LITRE’s Annual Report will summarize and reflect on relevant assessment results gathered outside of LITRE, in order to learn even more about the effectiveness of learning technology applications for improving student learning in the four dimensions identified above.

2. **Investigate systematically the effectiveness of technology-based innovations in learning and teaching**

   We will develop an ongoing and systematic inquiry by monitoring the impact of LITRE projects on student learning and by investigating questions raised by previous projects. We may also evaluate innovations adopted by other institutions for possible application on our own campus.

   **Measurement strategies:**
   a. *Monitor LITRE Grant applications*: The content of LITRE grant applications will be analyzed to document how systematically LITRE investigations are advancing and building on previous experiences. Over time, we expect LITRE Grant RFPs to encourage prospective investigators to consider technology applications that address identified problems or adapt previous successes in new departments and degree programs.

   b. *Monitor Lessons Learned from LITRE Projects*: Qualitative evidence of systematic investigation related to the LITRE Goals will be summarized in the LITRE Annual Report. Over time, we would expect to see development and evolution of lines of inquiry into which broad strategies and investments are most effective in improving student learning in the identified domains.

3. **Use the results of these investigations to scale our successes and inform campus decision making.**

   Having determined what works, we will apply assessment results to future decisions about student and faculty engagement, policies governing the use of and rewards for using technology to improve learning, and resource deployment. In this way we will build on our successes and minimize ineffective investments.

   We expect that the specific issues we choose to address will change as we learn and as we solve old problems. Now, for example, we are focused largely on learning in the classroom, including specific teaching techniques, classroom equipment, and support. In the future, we expect that the focus of LITRE may be redirected to other issues. Accordingly, the particular measures we use to monitor our progress toward this goal may change over time.

   **Measurement strategies:**
   a. *Academic and Administrative Unit Plans*: A qualitative review of department, college, and university plans will reveal whether successful LITRE
innovations have diffused and been adapted by units other than the unit that hosted the original project.

b. **LITRE Faculty Survey:** We will add questions on the next survey to find out what faculty in general are learning from the results of LITRE projects.

### 3a) Increase student and faculty engagement with technology when shown to be effective in improving learning and teaching.

Based on what we learn from our investigations, we will encourage uses of technology that shown to be effective in improving learning and teaching. Ineffective uses will be discouraged.

#### Measurement Strategies:

1) **Survey Faculty:** The current LITRE Faculty Survey questions faculty about the range of teaching/learning technology used in various class sizes and levels, about why they do/don’t use them, and about training, support, time available, and university policies affecting their use.

2) **Survey Sophomores and Graduating Seniors:** The current surveys ask students how often various technologies are used in their courses. These questions allow us to track technology used by faculty and students.

3) **Track Professional Publications, Presentations, and External Grant Applications:** The number of scholarly works related to innovative uses of technology in teaching and learning will provide evidence of faculty engagement with learning technologies. This information is not currently available; however, we will ask that the newly proposed annual faculty activity report format include a LITRE flag for these activities.

4) **Monitor LITRE Grant Applications:** The number of grant applications will provide information about the level of faculty interest in experimenting with technology innovations in their teaching.

5) **Review Results of Specific LITRE Projects:** Depending on the specific goals of a project, its assessment may provide useful evidence of student engagement. One of the first wave projects, for example, is “Flyspace”, where students can work on projects as teams using sophisticated technology. The LITRE Annual Report will summarize what individual projects tell us about student engagement.

### 3b) Develop appropriate, learning technology-friendly policies.

The LITRE plan calls for a variety of University policy barriers to be reexamined in light of the LITRE vision for using technology to improve student learning (LITRE plan, p. 29). Examples include intellectual property and copyright policy, tuition and fee charges for distance education, the computer literacy general
education requirement, and promotion and tenure policies. As of this writing, the new LITRE Advisory Board has not yet identified the specific policy issues it wants to promote; however, the first three listed above undergoing active debate with LITRE participation.

**Measurement Strategies:**

1) *Survey Faculty:* The LITRE Faculty Survey provides information about how and why faculty use certain technologies in their courses and provides an opportunity to address a variety of policy issues, such as compensation, rewards and recognition, and ownership of intellectual property.

2) *Monitor changes in related policies:* In its Annual Report, the LITRE Advisory Board – which is charged with attacking policy and environmental barriers to improving teaching and learning with technology – will provide a progress report on policy issues it considers most important to learning and teaching with technology. The content and measures in this overview will depend on the particular issues identified.

3c) **Improve the physical learning environment.**

The availability of well equipped classrooms and appropriate classroom support has been a major interest of faculty throughout development of the LITRE plan.

**Measurement Strategies:**

1) *Monitor classroom technology inventory:* As described in the plan, one of the first steps was to update the classroom inventory to include recent changes in the availability and functionality of technology in each classroom. This inventory was completed in summer 2004 and will provide a baseline for tracking the number, distribution, and use of classrooms meeting new technology standards.

2) *Assess LITRE ClassTech Project:* Assessment results from the first-wave ClassTech project and related follow-on LITRE projects will provide information about how specific technology configurations help student achieve specific course objectives. Results from multiple classroom settings will be generalized to answer questions about how technology affects teaching and learning, and about the effectiveness of support and training provided for faculty in project classrooms.

3) *Survey Faculty:* The LITRE Faculty Survey provided baseline information about how and why faculty use certain technologies in their courses. This survey is helpful in directing attention to a variety of issues, such as availability of technology in the classroom, maintenance, training, and technical support.
**Milestones and Timelines**

Assessment timeline and responsibility for data collection and reporting:
The appendix includes information about each of the measurement strategies listed above. This information includes the schedule, URL, and the office or team responsible for completing and reporting on each analysis to the LITRE Advisory Board.

Each spring the LITRE Advisory Board will prepare an Annual Report summarizing the university’s progress on each goal. In the fifth spring (2009), the Board will prepare a summative report covering the first five years of LITRE activity and contributions to student learning.

Milestones:
In the first year or two (2005, 2006), while LITRE is young, we will be looking for formative information we can use to improve the effectiveness of LITRE as an organizational strategy to stimulate innovation. In later years, we will be looking for evidence of changes in student learning, faculty and student engagement, and the learning environment including both policies and facilities.

In 2009, as the University prepares its fifth year report, the LITRE Advisory Board will summarize five years’ of progress toward LITRE’s goals. We will judge the LITRE effort to be successful if we have improved student learning and if we have learned when and how to use technology effectively to that end. Following are specific examples with baseline information where available.

- We would like to see that a substantial proportion of LITRE project assessments show enhanced student learning. (Goal 1)
- We would like to see a higher proportion of surveyed students report that NC State contributed greatly to their knowledge and competency in the four dimensions of student learning of interest to LITRE. (Goal 1) Currently, 65% of our graduating seniors say NC State contributed “very much” to their ability to critically analyze ideas and information. Somewhat fewer (58%) said NC State contributed “very much” to their ability to engage in scientific inquiry. Sophomores’ ratings are lower, with 46% saying NC State contributed “very much” to each of these skills.
- We would like to find that a higher proportion of graduating seniors report experiencing a wider range of effective teaching/learning technology in their courses, and that they say they learn as well or better with these technologies. (Goals 1, 3) Currently, fewer than half of our graduating seniors reported that they learn better with technology, and somewhat more than half said technology made no difference in their learning.
- We would like to find that a higher proportion of faculty use a wider range of technology more effectively in a wider range of courses. (Goal 3) Currently, faculty teaching in small, upper level classes are more likely to report using technology.
- We would like to find that a lower proportion of faculty report that they
• think teaching/learning technologies aren’t appropriate for their courses.  
  (Goal 3)  *Currently, half of faculty responding said technologies weren’t appropriate.*  
• don’t know about or have the skills to use teaching/learning technologies.  
  (Goal 3)  
• don’t have time to develop ways to use these technologies to support students using them.  
  (Goal 3)  *Currently, nearly one-sixth of faculty members responding said they didn’t have time.*  
• don’t have access to technology-rich classrooms, or they don’t want to use them because of poor support.  
  (Goal 3)  *Currently, about a third of faculty responding said they don’t have access to equipped classrooms.*  

• We would like to see that some significant policy issues related to the use of technology in teaching and learning have been addressed.  (Goal 3)  
• We would like to see more faculty publications and presentations displaying their scholarship around teaching and learning with technology.  (Goal 2)  
• We would like to see evidence that innovations in teaching and learning with technology discovered and documented through LITRE projects are diffused and scaled up in other areas of the university.  (Goal 2)  

We believe that LITRE will prove to be a useful strategy for supporting and learning from innovations in teaching and learning, and we hope that it will become a permanent part of the NC State academic landscape.  However, LITRE will not be sustained indefinitely if it does not achieve the desired impact.  The LITRE Advisory Board’s 2009 report will include a recommendation to the Provost whether LITRE should be continued.