Comprehensive Standard 3.3.1.1

The institution identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of improvement based on analysis of the results in the following areas: educational programs, to include student learning outcomes.

  X Compliance   ___ Non-Compliance

Proof/Explanation:

Tennessee Technological University (TTU), as a member of the Tennessee Board of Regents (TBR) system, is required to participate in ongoing, integrated, and institution-wide evaluation processes that are research based. These research-based evaluations are guided by clearly defined program goals that are linked to University-wide strategic planning goals, as well as TBR system-wide strategic goals. Student learning outcomes are identified and assessed by each academic unit to monitor and verify student progress. This interim report provides evidence of ongoing evaluation of program goals and student learning outcomes.

Identification of Expected Outcomes

Each academic unit on campus has developed specific program goals that are unique and appropriate for that academic unit. Unit Program Goals are based not only on TTU strategic plans, but in many cases, accreditation requirements (1). For units that do not hold accreditation, academic reviews/audits and program reviews are in place to monitor progress toward goal achievement. TTU offers a variety of undergraduate and graduate degrees, including distance learning programs. Program goals for each of these types of degrees were reviewed for compliance.

Each academic unit on campus has developed specific student learning outcomes that are unique and appropriate for the degree programs of that unit. Student learning outcomes provide definition of student learning and how that learning is measured for progress. Student learning outcomes for each academic unit were reviewed for compliance.

Assessment of the Extent to Which Outcomes Have Been Achieved

University-wide Assessments

The University provides a battery of assessments and makes these results readily available to academic and administrative units across campus for the purpose of strategic planning. These assessments include

- Major Field Exams (administered by individual departments)
- California Critical Thinking Skills Test (CCTST)
- Critical Thinking Assessment Test (CAT)
- The National Survey of Student Engagement (NSSE)
- Individual Development and Educational Assessment (IDEA Evaluations)
- Alumni Satisfaction Survey
- Employer Satisfaction Survey

A summary schedule of assessments and changes since 2006 is available (2).

Results of University-wide assessments are available on the Strategic Planning website (3).

Major Field Exams are administered by various program units across campus on a semesterly basis (1).

The **California Critical Thinking Skills Test** (CCTST) serves as TTU's general education exit exam and is given to graduating seniors at the end of each semester, with the results being available at the beginning of the next semester, broken down into disciplines and colleges. Additionally, various programs across the University employ TTU's own Critical Thinking Assessment Test (CAT) test to assess their students at various stages of their career as students.

The **National Survey of Student Engagement** (NSSE) obtains information from random samples of first-year and senior students about the nature of their undergraduate experience. First offered in 2006 and then again in Spring 2009, 2011, and 2013, the NSSE replaced the Enrolled Student Survey (ESS) in 2005. Results are made available in a discipline-specific format and comparison is made with TTU's Carnegie Peers as well as other Tennessee universities.

IDEA evaluations are administered in classrooms during the last two weeks of every semester and results are made available at the beginning of the following semester. Academic chairs are provided these results by their own faculty. Frequent IDEA evaluation is required according to a policy statement published in the Faculty Handbook (4). Tenure-track, full-time temporary, and part-time faculty, as well as teaching assistants with grading responsibility for courses have all their courses evaluated every semester (summer courses excluded). All tenured faculty must submit at least two IDEA evaluations per year to their department chair or director.

In addition to various surveys given by departments to their alumni, an **Alumni Satisfaction Survey** is administered by the University every two to three years (2005, 2007, 2010, 2012).

An **Employer Satisfaction Survey** is administered by the University (2008, 2013). The most important skills identified by employers are tabulated, in addition to ratings of TTU graduates.

Unit-wide Assessments

A systematic review was conducted in which each academic unit submitted its Program Goals/Student Learning Outcomes Report to the SACS Institutional Effectiveness Review Committee. Each report contained data collected by the unit during the last five years that documented adherence to assessment of outcomes and evidence of key continuous improvements.

Each report was reviewed for compliance with the following parameters:
1. Clearly written program goals
2. Measurement of program goals
3. Evidence of collection of data related to program goals
4. Evidence of how the data was used to improve program quality
5. Clearly written student learning outcomes
6. Measurement of student learning outcomes
7. Evidence of collection of data related to student learning outcomes
8. Evidence of how the data were used to improve student learning

Evidence of Improvements Based on Analysis of Results

Review of the unit reports yielded several examples of exemplary assessment results. For instance, programs in the **College of Arts and Sciences** have made systematic and widespread use of assessment data in decision-making to improve their educational programs.

The Physics Department has become a University leader in the design and implementation of inquiry-based laboratory learning for their students. A survey of students in introductory lab classes revealed satisfaction with the preparation of TAs, but less satisfaction with the structure of the labs themselves. For this reason the Department shifted their emphasis from TA training to the gradual restructuring of lab classes to be more inquiry-based.

Discussions of pedagogical developments now regularly take place between faculty members, and six of seven faculty are now considered to be employing some form of active learning in at least one of their classes. With NSF grant support, two faculty have since developed a guided-inquiry style curriculum for the PHYS 2010 course, and the average gain for these pilot sections has been around 55%. The most recent physics alumni survey (Fall 2008) revealed that lack of emphasis on computational techniques was a perceived weakness of the program. In response, the department developed a coordinated program to address computation as one of the initiatives proposed in its 2009 academic audit. The department is now in the second year of implementation of this plan.

The Chemistry Department has been monitoring a new critical thinking assessment indicator on the Chemistry Major Field Exam. When compared to the median scores of 227 other universities, TTU chemistry graduates scored in the following national percentiles (2007-2010); 44, 41, 44 and 64%. The Department points to the importance of undergraduate research as a means by which students can increase critical thinking and problem-solving abilities. In the last two years, as a result of these efforts, approximately 50% of their students have been involved in undergraduate research. Each year since 2007, the TTU Chemistry department has sent either the highest or the second highest number of undergraduate students to the national American Chemical Society (ACS) meetings to present the results of their research.

In the Mathematics B.S. program, the use of teaching technologies such as online homework has played an important role in improving major field exam scores of mathematics graduates, moving them from the 40th percentile in 2004 to consistently in the 80-90 percentile of the past five years.

The Department of Foreign Languages (DFL) has been tracking NSSE data on its majors to assess goals related to writing clearly and effectively. Scores were significantly higher for 2011 than for 2009 for foreign language majors. The NSSE 2009 score of 2.4 rose to 3.25 in 2011 for "writing clearly and effectively," which is higher than both the TTU mean and the Carnegie Peer mean for that year. The score on the NSSE for "speaking clearly and effectively" was 2.6 in 2009 compared to 3.0 in 2011. Additionally, the DFL is tracking achievements of its graduates. Since the last SACS review, three foreign language majors have received French government teaching assistantships, three have been accepted for Steuben-Schurz internships in Germany, and three have received Fulbright awards.

The Department of Political Science, in addition to tracking major field exam results, has been assessing improvement of student critical thinking skills by analyzing the Department's IDEA Student Evaluation results. The percentage of political science instructors identifying critical thinking as a key course objective has risen sharply since 2006, and the percent of students citing significant progress in critical thinking in the related courses have risen from 46 to 56% over the same period.

The Biology Department tracks critical thinking through IDEA evaluations as well, and students in their programs made significant and quantifiable progress in critical thinking through its program initiatives to increase the use of active learning strategies in biology coursework and internship programs. Senior questionnaires and discussions with individual students have indicated that professional extracurricular activities are considered an integral part of their educational experience. Consequently, Biology has intensified efforts to provide extracurricular opportunities.

In Earth Sciences, a goal of enhanced critical thinking has been set for their majors, to be accomplished through the senior thesis, to be assessed by the California Critical Thinking Skills test (CCTST) and by the number of students presenting at local, state, and national levels. As of May 2011, 54 geosciences students have submitted theses that have resulted in 29 presentations at regional or national scientific meetings. CCTST results from 2007-2011 range from 17.0-18.9, while the national average for the same time was 16.8.

The History Department values student understanding of the delicate *relationships* between historical facts, hence the near uniform faculty preference for hard-to-quantify essay exams as opposed to reliance on standardized tests which only assess factual knowledge. The Department has also been experimenting with value-added testing. Results are most encouraging, with every case demonstrating substantial improvement. By comparing essays from

History 3410 with those from History 4990, department faculty can demonstrate value-added research skills among their graduates.

In the **College of Engineering** the Electrical and Computer Engineering Faculty have established a new Electrical Energy and Power lab to improve laboratory instruction to students based on feedback received from their accrediting body and alumni surveys. Within the department of Chemical Engineering, feedback on program goals and student learning outcomes was used to initiate a new Biomolecular Engineering concentration (within the BS-Chemical Engineering Degree) in 2007. Currently the concentration has enrolled 80 students being the fastest growing concentration within the College of Engineering and the only one of this type within Tennessee. As part of the continuous improvement efforts in the Chemical Engineering program, a new and more pedagogically coordinated sequence for the transport phenomena courses is being tested. This provides a "student learning-center" platform. The Department of Chemical Engineering focuses on three pillars for the education of the future chemical engineers, i.e. hands-on, team-based learning, and critical thinking approaches. The anchoring pedagogical model for this approach is the Hi-Pe-Le that was highlighted by the National Science Foundation (NSF) as one of the best practices.

The Department of Civil and Environmental Engineering (CEE) uses a wide variety of assessment methods to monitor program goals and student learning outcomes including: Fundamentals of Engineering exam, course portfolios, senior exit surveys, alumni surveys, and employer surveys. Results of assessment tools are used by four advisory committees (ABET, curriculum, computer, and equipment) in joint or respective consideration to arrive at recommendations that are acted upon by the CEE faculty. An example of how assessment results have been used to drive improvements can be found in senior exit surveys regarding laboratory facilities: students requested improved laboratory facilities. The upgrade of CEE 3120 (Mechanics of Materials laboratory) began in Summer 2006 after necessary funds became available. The improvement included new tension and torsion testing machines, new Instron universal testing machine, new computer software for experiments, a newly manufactured test specimen for stress concentration, and room renovation for lab security. The survey ratings for lab facilities are clearly improved after the renovation.

Within the **College of Agricultural and Human Sciences**, the School of Nursing uses highly specific assessments such as the NCLEX-RN exam scores and accreditation reviews to monitor progress toward program goals and student learning outcomes. Examples of how the School of Nursing has used this assessment data include NCLEX-RN advisement with each student having his/her own NCLEX-RN advisor to develop an individualized plan for enrichment. Nursing 4450 and 4451 were also restructured to enhance NCLEX-RN enrichment.

The **College of Business** has expanded learning opportunities for students by partnering with the FH-Aachen School of Applied Sciences in Aachen, Germany for a dual degree in business and with TTU's Department of Music to offer a minor in business for music majors. Assessments revealed weaknesses in grammar and word choice. The Fatal Five online tutorial was developed with faculty input to address these weaknesses, and an oral communications training module has been developed. These resources are available to all students and instructors in the College and the University (5) and they continue to evolve. In order to improve the professional and communications skills of students early on in the undergraduate program, all students affiliating with business are required to attend Professional Development Week (PDW) events that include writing and oral communications awareness workshops and an etiquette dinner.

Responding to the survey feedback from its Accounting Advisory Board, the Department of Accounting has created the Accounting International Experience course to broaden the global awareness of its students. In Spring 2011, twenty students and two faculty members traveled to London, UK. The trip included visits to multiple businesses, including a lecture at the Institute of Chartered Accountants of England and Wales on International Financial Reporting Standards. Student feedback indicated that the course was a positive learning experience. The course will be offered every year as long as there are faculty to staff the trip.

In the **College of Education**, curriculum changes have resulted from assessment findings in the graduate program in counseling and psychology. All students complete a thesis or applied research course project that meets specific criteria established by the graduate faculty and that is consistent with professional standards in the field. Faculty observations of weaknesses in student work have led to modifications in the non-thesis option and the development of a new course in applied research that gives students more experience in critically evaluating research and interpreting implications of research studies in their areas of concentration. This course culminates in a written and oral presentation of an area of research that can be evaluated by the graduate faculty.

Assessment of Distance Learning Programs

Tennessee Technological University employs a variety of course delivery methods. For example, within the Department of Exercise Science, Physical Education and Wellness, a distance master's program with several concentrations is offered. Concentrations in distance master's program include Elementary & Middle School Physical Education; Licensure; Fitness & Wellness; and Adapted Physical Education. These programs are evaluated the same way on-campus programs are evaluated. Exit exams/major field tests are similarly available to all students. Computer-based exams are available on TTU's campus, and paper-based exams are available in Nashville, Knoxville, or Chattanooga. The student's choice determines the test format. IDEA evaluations are handled similarly to on-campus classes. The results are reported together. Based on review of assessment data for online courses, the EXPW department is exploring ways to increase response rates for the evaluation of its online master's degree.

The Curriculum and Instruction Department offers a 2+2 off-campus undergraduate program. It is evaluated the same way as the on-campus programs are evaluated. The instructors are full-time TTU faculty who teach at off-campus locations. Exit exams/major field tests are similarly available to all students. Computer-based exams are available on TTU's campus and paper-based exams are available in Nashville, Knoxville, or Chattanooga. The student's choice determines the test format. IDEA evaluations are handled similarly to on campus classes.

The College of Business offers a distance MBA program. The online MBA courses are taught and learning outcomes assessed with the same rigor and consistency as the other on-campus business courses. Grades assigned to online and on-campus students are monitored. A new assessment method to complement the MBA-ETS exit exam was developed. An interdisciplinary faculty team evaluated case assignments from the capstone course. These evaluations indicated that revisions were needed in the front end core MBA courses. They also revealed that integration issues should be addressed throughout the MBA program. Moreover, course-embedded assessments led to the revision of the MBA case format. Group cases are now more focused on ethics in the capstone class, and iPod lectures on ethics are provided.

In the Department of Accounting, monitoring of grades assigned, along with the course-embedded assessments throughout the Department ensure that students receive approximately the same quality of instruction and learning opportunities - whether in online or on-ground classes. Comparable quality is an ongoing goal of the Department. The Department takes appropriate steps to see that students registering for online classes have the appropriate academic background/preparation. Non-traditional students (many of the online students) must provide an official transcript to facilitate checking of course prerequisites. Data indicate that grades assigned in the traditional and online course sections are relatively comparable.

 The Department of Music and Art offers two courses off-site, and these courses use the same assessment methods as on-campus courses. The content, syllabi, and textbooks used are the same for the off-campus and on-campus versions of these courses. The instructors are full-time TTU faculty who travel to off-campus sites to hold classes. Based on review of assessment data, the Department of Music and Art is collaborating with Extended Education Programs to improve coordination of assessment methods and measurements.

<u>University Initiatives to Promote Program and Learning Outcomes Assessment</u>

The University has made considerable efforts to foster a culture of assessment-based planning among academic units. Dr. Barry Stein served as Director of Planning from 2000 –2009. His responsibilities included coordinating, analyzing, and reporting on strategic planning; assisting units with program and learning outcome plans; organizing, analyzing, and reporting on various campus-wide assessment activities including general education assessment, critical thinking assessment, teaching evaluations, and coordinating the distribution of assessment and planning information through the web. He also headed the development of the University's QEP proposal. A separate QEP Director, Dr. Thomas Timmerman, was appointed to coordinate the SACS-approved QEP. A web-based Institutional Effectiveness System was implemented that integrated unit planning and University-wide strategic planning. This system was subsequently expanded to include program and learning outcomes for each program at the University. In 2009 the University separated planning and assessment responsibilities. Planning activities were transferred to the Vice-President for Business Affairs, and a full-time person was hired, Dr. Theresa Ennis, as Director of Assessment for the University. The existing Institutional Effectiveness System was replaced by a modified system that does not include program and learning outcome information for each program of study. However, program and learning outcomes assessment has continued, as documented in the unit reports, and academic units are reporting to their respective deans and directors.

The TTU Center for Assessment and Improvement of Learning (6) is funded by NSF to disseminate its Critical Thinking Assessment Test (the CAT instrument) to other undergraduate institutions across the country, to provide assessment assistance to other NSF projects that are trying to improve students' critical thinking skills, and to continue to develop and refine new versions of the CAT instrument. NSF support for this Center spans 10 years and includes over $3.9 million in funding. The Center currently has collaborations with over 100 institutions across the country and is working with many institutions in the SACSCOC region. Dr. Stein is the PI and Director of the Center and a frequent presenter at SACSCOC meetings.

<u>University Efforts to Promote Active Learning Strategies</u>

In addition to efforts of individual units to promote research-based learning practices, as documented in the unit reports, the University has undertaken campus-wide initiatives that support critical thinking, effective communication, team-based learning, real-world problem solving, and hands-on minds-on learning strategies.

A major initiative is the inception of **Learning Villages** (7). The first two of ten proposed villages was established in Fall 2010 and two more were opened in Fall 2011. A learning village is a living and learning community that resides in a particular residence hall on campus, plus has membership from students living off campus. Each residential village has a faculty head with an office in the residence hall. Working in partnership with Residential Life staff, the faculty head helps cultivate a variety of cultural and intellectual interests among the students, as well as working with student leaders to develop an effective system of self-governance. Other faculty may serve as associates (or "fellows") to villages of their choice. Certain classes are taught in the village, such as sections of UNIV 1020, ENGL 1010, or colloquia. Support services reside in the villages, such as computer labs, tutoring and some advising. Associate faculty may have opportunities to interact with students through special colloquia, field trips, events, and such. Activity space is being created in each village to support village events. One of the larger aims is student retention and, ultimately, *student success*. The village concept is designed to make a large university seem smaller, more inviting, and more personal. It enhances student-faculty interaction outside the classroom, creates more opportunities for student leadership, and ultimately can transform our campus from a commuter campus to a 7-day-a-week learning center. Student experiences in the Learning Villages are assessed through the office of the TTU Director of Assessment on an annual basis, and results are evaluated for planning purposes by a council consisting of a steering committee of faculty and administrators along with faculty heads.

While several departments on campus already have an active program in undergraduate research, a committee of six faculty members across disciplines assembled in 2008, and proposed that a greater emphasis on undergraduate research and scholarly activity across the university would not only assist in addressing our commitments to lifelong learning and real world problem solving, but would also enhance the capabilities of individual units to support undergraduate research. This has evolved into the new **URECA! Program** (8). The URECA! (**U**ndergraduate **RE**search and **C**reative **A**ctivity) Program is providing monetary assistance (beginning Spring 2012) for undergraduates who pursue research and creative activities at TTU through academic year mini-grants, summer grants with stipends, and travel grants for students and their accompanying faculty mentors. The program is administered by the Office of Research and Graduate Studies.

Many academic units on campus value effective communication and have set learning goals for their students aimed at enhancing communication skills. The University is supporting these efforts by creating its own venue for students to practice presenting results of their research. Sponsored by the TTU Office of Research and Graduate Studies, the TTU Student Research Day (9) has been in operation since Spring 2007. It has grown steadily to well over a hundred presentations and involves undergraduate and graduate students (10).

In 2010, the General Education Award for Outstanding Teaching was created to recognize exemplary teaching in the 1000- and 2000-level courses that fulfill general education requirements in communications, history, humanities/fine arts, math, natural sciences, and social/behavioral sciences. This award recognizes the value and innovation being done in the introductory-level courses. The faculty who teach these courses lay the foundation for a successful college experience and, hopefully, foster an interest in lifelong learning (11).

In order to enhance the learning environment, the main library and media center has undergone extensive renovations. In Fall 2011, a new Learning Commons was added (12). The Learning Commons provides presentation, group collaboration, and group study rooms and technologies to support distance learning.

Supporting Documentation:

1. http://www.tntech.edu/files/sacscoc/compliance/TTU_Perf_Funding_2010-2015_Planning.pdf
2. http://www.tntech.edu/files/sacscoc/compliance/SACSCOCTypes_of_Assessment.pdf
3. http://www.tntech.edu/strategicplanning/ttu-assessment-data/
4. http://www.tntech.edu/facultyhandbook/evalofinstruction/
5. http://www.tntech.edu/cob/fatal-five/
6. http://www.tntech.edu/cat/home/
7. http://www.tntech.edu/reslife/livinglearningvillages/
8. http://www.tntech.edu/research/ureca-program/
9. http://www.tntech.edu/research/events/
10. http://cmat.tntech.edu/snorthrup/ResearchDay.pdf
11. http://www.tntech.edu/pressreleases/ttu-rewards-exemplary-general-education-professors/
12. http://www2.tntech.edu/library/learningCommons/index.asp.