

TWO ACCREDITATION VISITS AND ONE STORM: A NARRATIVE OF PROGRAM OUTCOME DEVELOPMENT

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Abstract

This paper describes how the faculty of Engineering Technology at McNeese State University (MSU) prepared for their initial outcomes-based accreditation visits by TAC of ABET and the Southern Association of Colleges and Schools (SACS).

In 2002, multiple programs within the Department of Engineering Technology were visited for initial TAC of ABET accreditation. This accreditation used the methods in place before the advent of ABET's outcomes-based Technology Criteria 2000 (TC2K). In the Fall of 2004 preparations began for the outcomes-based visit of 2008. MSU and our department were also preparing for the outcomes-based SACS reaccreditation visit in the Spring of 2007.

It was anticipated that the department would have two normal years to develop and modify its SACS assessments, and an additional two years to prepare for the 2008 ABET visit, but this was not to be. Hurricane Rita slammed ashore on the Louisiana - Texas border, passing approximately 35 miles west of McNeese during the morning hours of September 24, 2005. As a result of the storm, widespread destruction occurred in the Lake Charles area and on the campus of MSU. Nearly every building on the McNeese campus suffered damage. Drew Hall, which contains Engineering Technology offices, classrooms and some lab facilities, remained closed until January 22, 2008. The department faced a normal academic workload, the upcoming accreditation visits, and the inconvenience of faculty offices, classrooms, and lab facilities spread across campus. Efficient sharing of assessments and most outcomes were used to successfully complete both reaccreditation visits.

1. Accreditation Background of McNeese State and Engineering Technology

McNeese achieved Commission on Colleges/Southern Association of Colleges and Schools accreditation in 1954 and is accredited to award associate, bachelor, master, and specialist degrees [1]. The SACS reaffirmation accreditation described in this paper was the first for McNeese using an outcomes-based method.

In the Fall of 2002, the Department of Engineering Technology at McNeese (then the Department of Technology) was visited by a TAC of ABET team to review the three concentrations of the A.S. in Engineering Technology: Electronics, Instrumentation, and Process Plant Technology. The programs were recommended for accreditation in July 2003, and were

formally accredited in September 2003. Because the Electronics and Instrumentation programs share a number of common classes and instructors, they were treated as “closely related” programs by ABET and shared one Self-Study, with a separate Self-Study for the Process Plant concentration. The Electronics and Instrumentation concentrations in the B.S. in Engineering Technology were accredited at the same time, while the new B.S. concentration in Process Plant Technology was not visited for accreditation until the 2004-2005 academic year. All programs evaluated by ABET in Fall 2002 and accredited in Fall 2003 were evaluated under the conventional methods of accreditation, not the newer TC2K.

In the Fall 2004 semester the process began to develop Program Outcomes for the A.S. and B.S. concentrations in Electronics and Instrumentation as well as outcomes for the 2005 SACS Master Plan/Progress Report (MP/PR). The B.S. concentration in Process Plant was being visited for its initial accreditation with TAC of ABET that semester and would be evaluated using the TC2K criteria.

2. Early Assessment Methodology Work at MSU

The Process Plant faculty worked in 2003-04 to prepare for their ABET visit in Fall 2004. The faculty developed the program outcomes based on the skills that they felt the program attempts to instill in students, and were consistent with the feedback obtained from a program development survey and conversations with industry partners and advisory board members [2]. The outcomes used a combination of exit surveys of graduates and assessment data from courses. The methods used were very labor intensive, and probably involved too much work to be used for SACS work every year, but showed a commitment by the faculty to set program outcomes and to assess student work. The assessment method was based on how every technical course met a part or all of a program outcome, and while the method was well-designed to make changes at the course level, it did not easily lend itself to evaluating program outcomes. It is worth noting that the development of the Process Plant program outcomes was partially facilitated by a workshop held at Bucknell University titled *How to Engineer Engineering Education*. Workshop activities included helping faculty identify program outcomes and developing assessment tools.

At the same time, MSU was preparing for the 2006-07 visit by SACS for reaccreditation, also using the assessment method for the first time. Brent Garner and James Dautenhahn, the Department Head from 2003 – 2005, attended a seminar at MSU designed to train faculty members in the development of outcomes. Using this training and the experiences of the Process Plant faculty, the A.S. and B.S. Electronics and Instrumentation concentrations Program Outcomes as listed in the next section were developed for SACS as well as for ABET. Separate A.S. and B.S. Process Plant SACS outcomes were developed based on the existing ABET Program Outcomes for the B.S. program.

Two very important decisions were made at this time regarding outcomes and assessments: the same outcomes would be used for SACS reports as well as for ABET TC2K work and to follow the previous ABET Self-Study separation of the concentrations for SACS MP/PRs (Electronics and Instrumentation using the same outcomes with Process Plant work done separately). While the 2008 ABET Self-Study documents would group together the A.S. and B.S. Electronics and

Instrumentation concentrations, the A.S. and B.S. programs have separate program outcomes and are discussed separately in Criterion 3 of these documents.

The 2005 SACS MP/PR included Program Objectives developed during the 2004-05 academic year, but had no assessment data. However this MP/PR had the same outcomes that would be used for ABET assessment as part of the continuous improvement process until the 2008 Self-Studies. A sample of that work is shown below in Figure 1. Note a lack of assessed data, the lack of specific assessed items, and a plan to do this by the 2006 MP/PR.

Objective 1: Make purchasing decisions for current electronic and instrumentation equipment

Assessment Method(s): Review student grades from the following courses: ELTR314 and INST304. Identification of particular assignments within these or other classes will be done before the 2006 Master Plan/Progress Report.

Performance Indicator(s): A class average of 80% for selected assignments or the courses listed above as a whole.

Measured Outcome(s): Most to be completed for the 2006 Master Plan/Progress Report, however some measured outcomes from Spring 2006 courses may not be available at that time.

Plan for Continuous Improvement: Reviews will take place on an annual basis using the results of the measured outcomes, plus any inputs from the other sources listed before Outcome 1.

Figure 1: B.S. Electronics and Instrumentation SACS Outcome 1 from 2005 MP/PR

3. The 2005-06 Academic Year at McNeese: Difficulties and Assessments

The Fall 2004 ABET accreditation visit was a success as the B.S. Process Plant program was recommended for accreditation in July 2005 and received its notice in August 2005. The joy over this accomplishment was both tempered by current events and short-lived as the ABET letter arrived soon after Hurricane Katrina devastated New Orleans, the McNeese campus was very involved in accommodating various groups of evacuees, and Hurricane Rita was soon to follow.

3.1 Hurricane Rita: Campus closure and Drew Hall damage

On Wednesday, September 21, 2005, as Hurricane Rita became a Category 5 storm in the Gulf of Mexico, students in Engineering Technology were completing afternoon labs and discussing upcoming tests. A month into the semester, many courses were beginning the first set of exams. Minutes later, all plans had changed as the university announced its emergency preparedness plan and closed for the remainder of the week. With classes expected to resume the following Monday, plans were quickly made to postpone the tests. When everyone left campus that afternoon, no one guessed that the rest of the fall would past, plus all of 2006 and 2007 before another class or lab was held in Drew Hall.

The eye of Hurricane Rita came ashore at the Louisiana – Texas border (Sabine Pass) west of Lake Charles, LA during the morning hours of September 24th 2005. Widespread destruction occurred in the Lake Charles area and on the campus of McNeese State University, with an estimate of property damage on the campus in excess of 30 million dollars. More specifically, a list of Hurricane Rita related facts follows:

- The faculty had only a couple of hours notice to evacuate their offices at the university, leaving little time to collect course-related materials.
- Lake Charles was under mandatory evacuation for over a week. The entrances to the city were patrolled by the National Guard with orders to turn everyone away except emergency workers. The few residents who stayed in the city and surrounding area were under a strict dusk to dawn curfew for 14 days enforced by local/state police and National Guard troops. Much of the area was without utilities for 10 to 30 days. Many student and faculty residences located between the university area and the Gulf of Mexico were completely destroyed.
- The MSU campus was closed, the entrances barricaded, and everyone except the military and emergency workers was excluded for 5 weeks. Every building on campus was damaged to some extent by wind and/or rain. The majority of MSU facilities reopened for use in a gradual process starting on October 28th 2005. Most of the students who had been resident on campus had no university housing available for their return. Many private apartment complexes in the region of the campus were either gutted or demolished. Unless students had taken books, notes, and other “school materials” when they evacuated, all was lost. One residence hall on campus (500 beds, the most affordable) is still closed. All Fall 2005 classes on campus were rescheduled, class times expanded, and the semester was extended until December 23rd 2005.
- In the end, 67 facilities, nearly every building on the McNeese campus, suffered damage. On December 15, 2005, Dr. Hebert accepted a \$1.5 million grant from the Bush-Clinton Katrina Relief Fund, a foundation created by the former presidents to help the recovery and rebuilding of the Gulf Coast region from hurricane damage. The State Insurer and FEMA provided additional funds. The Spring 2006 semester began on January 18 with Burton dormitory, the Financial Aid office, the Recreation Center, Frazar Memorial Library, the Student Union, Gayle Hall, Frasch annex, Drew Hall, and Bulber Auditorium still closed. Bulber Auditorium, on the National Register of Historic Places, required extensive repairs, and did not reopen until the Spring of 2008. Due to the elevated cost of construction as a result of the storm, four previously-approved capital construction projects were delayed into 2007, 2008 and beyond.
- Drew Hall, which is used by Engineering Technology for office, teaching and laboratory functions, remained closed until January 22, 2008 because of major water damage caused by a failed roof. ETL which is used exclusively for laboratory functions, sustained much less damage than Drew Hall, but also had to undergo repair and mold remediation. It, like the other buildings on the campus, had to undergo environmental testing, including architectural, mechanical, and engineering assessments before reopening for use. Due to the impact of Hurricane Katrina a month before in August 2005, these assessments took longer to complete, which delayed the opening of even nearly untouched buildings on

campus. ETL opened approximately a month after classes resumed, in time to run some electronics and instrumentation labs using the normal bench equipment. Faculty offices, classrooms, and labs were moved from Drew Hall into vacant space in Kaufman Hall (located at the other end of campus), temporary facilities, or portable trailers. The faculty remained in Kaufman Hall until the move back into Drew Hall on January 22, 2008.

- Even as campus life for most McNeese students and faculty returned to normal in the Spring 2006 semester, the Engineering Technology department had to readjust to life without regular offices, classrooms and labs. Scheduling remained difficult until the Spring 2008 semester, with classes held in multiple buildings on campus. As the time neared to return to Drew Hall, much time was spent by the faculty and staff ordering equipment for the department. The equipment replacement list was not always accurate and demanded great efforts to locate and document damaged equipment and furniture and to get those items added to the replacement list.
- To allow Drew Hall to reopen in Spring 2008, many faculty members spent large parts of the semester break packing up the offices in Kaufman Hall and supervising the moving of boxes, furniture and equipment into Drew Hall. Faculty members also took days of their 2008 Spring Break to supervise and assist during the delivery of new furniture into much of Drew Hall. Just after the end of the Spring 2008 semester, office equipment was delivered and once again, faculty members found themselves sorting out and organizing their offices. Even as the ABET Self-Study was being completed in August 2008, faculty were still in the process of reorganizing labs due to new furniture, setting up desired software for labs, and coordinating computer labs networking and software installation.

All of the problems associated with Hurricane Rita and the Drew Hall damage heavily increased the workload for faculty members, and when combined with normal academic duties and the two upcoming accreditation visits, made for a number of very difficult years [4].

3.2 Personnel Changes Add to Faculty Workload

James Dautenhahn, an 8-year member of the faculty and the Department Head from 2003-2005, smartly took sabbatical leave during 2005-2006 and thus was out during the so-called “Rita semester”. This leave, combined with other faculty health issues and loss of adjunct faculty post-Rita, caused even more difficulties as the faculty attempted to maintain a normal academic workload.

In the Summer of 2006, Dr. O.C. Karkalits, who served as Dean of the McNeese State University College of Engineering and Technology for 34 years, retired and was honored by the university with Dean and Professor Emeritus status. Two Engineering Technology faculty members served on the hiring committee for the Dean’s position, including one as the committee chair. Dr. Nikos Kiritsis, who had been a faculty member in the Department of Engineering since 1999, was selected to be the new Dean of the college.

3.3 2006 SACS MP/PR

The SACS MP/PR completed at the end of the 2005-2006 academic year added assessments to the program outcomes developed for the 2005 MP/PR. While a number of poor assessments

were used for this report - such as final grades and entire exams rather than specific questions on the exams - considering what the faculty had encountered in 2005-06, it wasn't a bad start. As an example of how the assessments were presented, an updated version of the B.S. outcome shown in Figure 1 is presented in Figure 2. With the 2008 visit still two years away, the department now had a year of assessments to begin the continuous improvement process.

4. 2006-07 Academic Year: SACS MP/PR Modifications and Continuous Improvement

4.1 New SACS Report Requirements

In February 2007, after discussions with the Institutional Effectiveness staff at McNeese, the 2006 MP/PR was updated and improved to include the percentage of students who meet a performance goal, rather than simply reporting an average score of assessed items. The faculty decided that 75% of the students should meet the goal of each outcome.

As a result of the SACS evaluation of McNeese State University in Spring 2007, even more changes were coming to the SACS reports and ABET assessment work. For the 2007 MP/PR due in May 2007, MSU requested that all programs have the same first three objectives, which are linked to the University's Mission Statement, and which are given below:

Student Learning Outcome 1: Graduates apply critical thinking in academic and professional environments.

Student Learning Outcome 2: Graduates formulate and express ideas effectively through oral, written, and/or technological communications in academic and professional environments.

Student Learning Outcome 3: Graduates analyze the global community to make sound judgments in academic and professional environments.

Outcome 1: Make purchasing decisions for current electronic and instrumentation equipment

Assessment Method(s): Review student grades from the following courses: ELTR314 and INST304. For the 2005-06 year, Test 1 and the final exam were used to provide the course outcomes from INST304, while the final exam and overall course grade were used for ELTR314.

Performance Indicator(s): A class average of 80% for selected assignments or the courses listed above as a whole. The class performance of 80% of the relevant course outcomes related to the program learning outcome should be met. Course outcomes not met indicate areas for improvement.

Measured Outcome(s): The measured outcome using the above assessment method was 85%.

Plan for Continuous Improvement: Reviews will take place on an annual basis using the results of the measured outcomes, plus any inputs from the other sources listed before Outcome 1.

Figure 2: B.S. Electronics and Instrumentation SACS Outcome 1 from 2006 MP/PR

While programs could have extra SACS outcomes, now called Student Learning Outcomes (SLOs), the existing ABET program outcomes and SACS outcomes had to work with this new structure in one of the following ways: existing outcomes could become one of the three common outcomes, existing outcomes could become extra SLOs, or existing outcomes could become assessed items within one of the common three SLOs. The previous B.S. Outcome 1 – shown in Figures 1 and 2 - now became an extra SLO, “Student Learning Outcome 4: Graduates will acquire the knowledge to make purchasing decisions for current electronic and instrumentation equipment.” An extra A.S. SLO was also added to allow the SACS MP/PR outcomes to match the ABET assessments as closely as possible.

Other changes were made to standardize the layout of the MP/PRs for all MSU programs and to include three columns for each SLO: Expected Level of Achievement, Actual Data From Assessment, and Actions/Decisions. The exact goal for each SLO and the items to be assessed were now shown in detail in the first column, the second column was used for a discussion of the results, and the third column for any actions to be taken based on the assessments[3]. Figures 3-5 show how the old B.S. Outcome 1 was now presented as the new B.S. SLO #4., although the actual MP/PR would show these figures in a landscape format of three vertical columns.

Expected Level of Achievement

75% of students will acquire the knowledge to make purchasing decisions for current electronic and instrumentation equipment by scoring a 75% or higher on the following assessment methods:

- * Final exam questions in INST304 with PLC hardware content
- * Survey questions from INST304 with PLC hardware content
- * Final exam results from ELTR314 that deal with lab equipment tradeoffs
- * Survey questions from ELTR314 that deal with lab equipment tradeoffs

Comment: This was Outcome 1 on the 2006 MP/PR for the B.S. concentration in ELTR/INST.

Figure 3: B.S. Electronics and Instrumentation SACS Outcome 4 from 2007 MP/PR

Actual Data From Assessment

In the 2006-07 academic year, 70.5% of students met the expected level of achievement of 75% on the assessments from listed courses. Since the goal was for 75% of students to meet the performance indicator the outcome was not met. A total of 4 assessments from 2 courses was used for this outcome. Two assessments had a fewer than 75% of students scoring less than 75%. These classes and assessed items are: INST304 Course Survey questions dealing with this outcome and the ELTR314 Final Exam embedded questions dealing with this outcome.

Figure 4: Discussion of Assessments for SACS Outcome 4 from 2007 MP/PR

Actions/Decisions

Efforts to include performance on this outcome will include a review of course topics dealing with purchasing decisions before the final exam and the course survey are administered. Note that in one class the students performed well on the final exam, but the survey results were low, while in another class the survey results were high, but the performance on the final exam was low.

Figure 5: Actions/Decisions for SACS Outcome 4 from 2007 MP/PR

4.2 Using One Set of Assessments With Two Reports

The 2007 MP/PR was a leap forward in assessment reporting, but it did create the problem discussed on the previous page: the SACS SLOs were no longer the same as the ABET Program Outcomes. The solution was to maintain one set of Excel-based assessments linked to the ABET outcomes and simply move those assessed items into the correct SACS SLOs.

Using the final year (2007-08) of assessments before the ABET Self-Study as an example, the five ABET Program Outcomes used for the A.S. Electronics and Instrumentation concentrations had a total of 43 assessments, with only 1 extra assessment needed for the SACS MP/PR document. The additional three ABET Program Outcomes used for the B.S. Electronics and Instrumentation concentrations had a total of 12 assessments, with 4 extra assessments used for the SACS MP/PR document. Compiling the extra assessments used in the SACS reports takes very little time.

Finally, as shown in Figure 4, SACS reports only include the percentage of students who score higher than 75% on the assessed items. The ABET Criterion 3 results are reported as a score and as a percentage of students of students scoring higher than 75%, with a typical phrase being used to report the results stating “Students scored 78% with 80% of students scoring at least 75%. The goal is for 75% of students to score at least 75%.”

5. 2007-08 Academic Year: Further Improvement and the Self-Study

With the SACS duties completed until new reports were due in May 2008, the faculty turned its full attention to preparations for ABET (and moving back into Drew Hall). In late Fall 2007, a number of College of Engineering & Engineering Technology faculty members attended a ABET assessment workshop led by Gloria Rogers, Ph.D. the Associate Executive Director of Professional Services for ABET. The workshop was a good source of information of the assessment/outcomes process, and of assessment practices and terminology. It also provided valuable document templates later used to present assessment data in the ABET Self-Study.

As the Spring 2008 semester ended, it was time to complete the final set of assessments needed for the ABET Self-Study and SACS MP/PR. Faculty turned in assessment results to the program coordinator in May 2008 (fall assessments may also be submitted in December), and the annual SACS MP/PR was quickly written. It took only a few hours for the program coordinator to take an old MP/PR, update assessment items and results, look for problem areas and make preliminary decisions. When the faculty returned to work for the fall semester, they met and discussed the results (within the first 3-4 weeks of the semester, so that any changes due to the assessments could be applied to classes or to degree changes for the MSU catalog).

The ABET Self-Study for the A.S. and B.S. concentrations in Electronics and Instrumentation was written in the summer of 2008. Because of the Rita-related duties still consuming much time in Spring 2008, and since McNeese provides summer pay to write the Self-Study, a request was made and approved by ABET to extend the Self-Study deadline by two months. Criterion 3 for the Self-Study is 29 pages long and was very time consuming, but due to SACS reports and the linkage between the two (use of common assessments), 3 years of assessments and actions were presented.

6. 2008-09 Academic Year: Gustav, Ike and ABET

6.1 Preparing for the Visit

The draft version of the ABET Self-Study was completed in mid-August 2008, but the final version was not completed until late August 2008. With Hurricane Gustav bearing down on the Louisiana coastline and a mandatory evacuation upcoming, the document was printed and shipped out before the campus was closed. Little or no damage was done to the Lake Charles area by Gustav, but within two weeks Hurricane Ike caused major damage in Cameron Parish (south of Lake Charles) and to many homes and businesses throughout the Lake Charles area due to storm surge. McNeese again shut down, missing a class day, and causing much extra work for faculty and staff to secure offices, labs, and equipment for the storm.

The TAC of ABET team visited McNeese in November 2008, and while the Electronics and Instrumentation programs ultimately received reaccreditation without any findings, modifications to outcomes and assessments were one result of the visit.

6.2 Program Outcome Changes

The ABET B.S. Program Outcome 1 (as has been presented from SACS documents in Figures 1-3), was modified to now read as “B.S. #1 Program Outcome: Analyze, design, and implement systems using current electronic and instrumentation equipment.” This change made the program outcome more general to correspond to electronics and instrumentation systems and to allow for assessments to be used from a senior capstone class. Not only did this improve the outcome, but it allowed the program to better demonstrate an ABET Criterion 9 (Program Criteria) requirement relating to the analyzing, designing, and implementation of electronics and instrumentation systems [5]. An additional assessment was added to another B.S. program outcome to better demonstrate a Criterion 9 requirement.

As a result of an initial finding in the A.S. Instrumentation concentration, the faculty added an additional program outcome that more explicitly corresponded to ABET Program Outcomes h to k of Criterion 3 [5], and used existing assessments or added new assessments to evaluate the outcome.

7. Suggestions and Lessons Learned

- a) Check your building’s roof! Seriously, remember to back up important accreditation data and documents. If there is a campus closure/evacuation, consider securing or relocating any actual student work that is being collected for assessment binders or the ABET “evidence room”.
- b) Matching SACS and ABET work saves time and forces you (via administrators outside of your department) to assess each year, make decisions, and to write reports.
- c) Check your program outcomes and assessments versus ABET Criterion 3 a-k and to any Criterion 9 Program Criteria. This could prevent some initial findings and extra work later to add outcomes and assessment items.

References

- [1] *2009-2010 McNeese State University Catalog*, 2010, page 16.
- [2] *ABET Self-Study Report for the Associates and Bachelor of Science in Engineering Technology-Process Technology*, July 2004, McNeese State University, page 27.
- [3] *2007 Master Plan/Progress Report, McNeese State University, A.S. and B.S. Engineering Technology concentrations in Electronics and Instrumentation*, Retrieved on February 12, 2010, <http://www.mcneese.edu/ie/masterplan/masterplan07/index.html>
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