

# The Quest for Outcome Assessment: The Faculty Course Assessment Reports

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**Abstract** – The Software Engineering Department at Southern Polytechnic State University is considering the challenge of seeking accreditation from Accreditation Board for Engineering & Technology (ABET). A major component of this quest is the current ABET Criterion 3 which revolves around the program outcomes and the assessment for these program outcomes. An implemented process inclusive of gathering metrics, a prescribed evaluation of the metrics, and a vehicle for continuous improvement in the next iteration is a mandatory requirement. The Faculty Course Assessment Report (FCAR) has been reported as an effective documentation tool used in course and program outcome assessment. This paper clarifies what the FCAR is, shows an example, and discusses their use in meeting ABET Criterion 3.

*Keywords:* FCAR, Course Assessment.

## INTRODUCTION

Software Engineering (SWE) is a relatively new discipline that is growing at an extraordinary pace in the computing industry. SWE is currently recognized as a stand-alone field of study within the computing disciplines enabling academia's emergence of Master and Bachelor degrees in Software Engineering. In 1998 Southern Polytechnic State University (SPSU) began offering a Master of Science in Software Engineering to facilitate professional software developers that were practicing this new discipline in the workforce with non SWE Bachelor degrees. Quickly a need for software engineers at the undergraduate level became apparent. To meet this need within the community, SPSU began to offer a Bachelor of Science in Software Engineering (BS SWE) in 2001. At that time there were no other undergraduate Software Engineering programs in the state of Georgia and only a hand full of SWE programs in the United States. Our first SWE Bachelor class graduated in Fall 2003. Effective that fall the first software engineering bachelor programs in the United States received accreditation from the Accreditation Board for Engineering & Technology (ABET). Mississippi State University, Rochester Institute of Technology, Milwaukee School of Engineering, and Clarkson University were the four first accredited programs. This past year Florida Institute of Technology and University of Texas at Arlington were accredited. Our Software Engineering Department began to consider the benefit of applying for accreditation. The decision to proceed towards a schedule ABET visit in Fall 2005 has been approved.

## ACCREDITATION PROCESS

This decision to proceed towards accreditation demands a method for assessment of the SWE program and the courses. Assessment began with an ongoing process of establishing clear, measurable expected outcomes of student learning. Determining whether the program courses were meeting the needs of the SWE program proves a difficult task. The assessment mechanism was to be standard within the SWE faculty. A Faculty Course Assessment Report (FCAR) from John Estell in Ohio Northern University was studied, discussed and found to be an excellent method for both course outcome assessment and program outcome assessment. FCAR provided a systematic

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gathering, analyzing, and interpreting facility done by the closest to the data, the course instructors. An additional ingredient in the FCAR methodology was the striving towards continuous improvement. The report contains the necessary traditional information regarding assessment with additional information about modifications, reflection, and further improvements. The program-level assessment is facilitated with these reports from each of the courses because the criteria for the program outcome have been evaluated. The FCARs provide data points for the final program objective assessment. [3]

## FCAR OUTLINE AND SAMPLE

The FCAR has the following nine sections:

1. Header
2. Catalog description
3. Grade distribution
4. Modification made to course
5. Course outcomes assessment
6. Program outcome assessment
7. Student feedback
8. Reflection
9. Proposed actions for course improvement [2]

The faculty teaching the required software engineering courses began to create the FCARs during the Spring 2004 term to demonstrate the effectiveness of the curriculum for the accreditation board. The following is one of the first.

### Faculty Course Assessment Report (FCAR)

#### 1. Header

Course: SWE 4324 – User Centered Design – 4 credit hours

Academic Term: Spring 2004

Course Coordinator: Barbara Bernal Thomas

#### 2. Catalog Description:

A course that presents the fundamental knowledge, processes, skills, and practices leading to the user-centered design of computer systems and applications. The course addresses the effectiveness of human interactions with computers by examining issues of physical ergonomics, cognition and perception, human memory and information processing, and usability. Software engineering techniques are covered leading to improved system effectiveness in supporting use of computers, user learning, diversity in interaction styles, and individual versus group work. Class exercises provide practice of needed skills. A major design and development project that integrates all aspects of user-centered design is included.

#### 3. Grade Distribution:

	A	B	C	D	F	W	Total
For the entire class	4	8	5	6	0	4	27
For the SWE students only	2	2	0	0	0	1	5

#### 4. Modifications Made to Course:

Slight modifications were done to the web assignments for this term for continuous improvement.

#### 5. Course Outcomes Assessment:

The 4 students' data that passed the course with a "C" or better was used.

1. Objective: Knowledge and usage of Human Computer Interactive (HCI) usability principles and guidelines, Source, Results: Midterm, Ave=2.0, EEMU=(1,2,1,0 ); Final Exam, Ave=1.25, EEMU= (0,2,1,1).

2. Objective: Gather the user, task, and environmental characteristics to form the user profile for a system, Source, Results: Web Assignment 1, Ave=3.0, EEMU=(4,0,0,0 ); Web Assignment 2, Ave=3.0, EEMU=(4,0,0,0 ).
3. Objective: Design and build prototype for two inter-related systems (Desktop and PDA) which meet the goals of user centered and task oriented, Source, Results: GUI Project, Ave=2.5, EEMU=(3,0,1,0 ).
4. Objective: Perform an HCI usability team test in the SPSU Usability Lab, Source, Results: ULAB Team Evaluation, Ave=3.0, EEMU=(4,0,0,0 ).

6. Program Outcomes Assessment:

**Program Outcome #5:** Contribute to multi-disciplinary teams in the design, implementation and evolution of software systems

The SWE 4324 assessment is done for the third performance criteria of this outcome:

3. Students will review, test, and evaluate the artifacts produced by their team and/or other teams in design, implementation, and evolution of a software system

Source of Assessment: Team Usability Evaluation Project

Average (3.0), EPAN vector (4,0,0,0)

The EPAN vectors show the students all performed at the Exemplary level.

**Program Outcome #10:** Recognize the impact their discipline has on society

The SWE 4324 specifically approached how systems that are user-centered designed, i.e. designed for the user, impact the current society.

Performance criteria:

1. Recognition of material

- a) Able to discuss one scenario or case study as it relates to how software engineering affects society

- b) Able to define and analyze contemporary issues in software engineering as they relate to society

2. Application of material

- a) Able to participate in discussions on topics of software engineering as applied to society

- b) Able to express with examples the impact of software engineering on culture, economy, social goods and services

Source of Assessment: Multiple Web Assignments and in class Q & A

Average (2.0), EPAN vector (2,1,1,0)

The EPAN vectors show the students performed at the Proficient level.

7. Student Feedback:

Each student gave a 5-minute unanimous feedback evaluation during the 12th week of the term. Student's comments were specific suggestions regarding some of the projects and lecture content. They commented regarding specific lectures, not understanding some of the Usability Evaluation and the usage of the video equipment of the Usability Lab. They also rated the separate Web activities.

8. Reflection:

The course is a half web delivery and half traditional classroom delivery. Students stated the preference of continuation of this combined delivery. Reflection of the students' learning, analysis, and reporting component performed in the web anytime, anywhere setting versus the tradition classroom setting suggest that improvement needs to occur in the web setting.

9. Proposed Actions for Course Improvement:

Focus on creating guidelines and suggestions for students' successful completion of the web assignments. Maybe some examples of previous successful student's reports posted with the web assignments.

## ANALYSIS OF FCAR

The FCAR provides a format that allows course assessment reports to be easily used as part of the program outcomes assessment. Each report describes the current offering of the course and allows for continuous review of the course description by all those who teach the course for improvement. Over time, it documents the major changes made to the course. The report is started at the beginning of the course with the course and program outcomes defined in sections 5 and 6 without assessment. This facilitates clearly defined measurable data the instructor will need to gather and assess from the course. The course outcome reporting is a 4-tuple performance vector called EEMU to categorize class performance of those who pass the course. EEMU represents a proficiency analysis based on the number of students that were Excellent, Effective, Minimal, or Unsatisfactory. For example, an EEMU = (5,3,4,1) states the 13 students assessed were 5 excellent, 3 effective, 4 minimal, and 1 was unsatisfactory in the specific course outcome. The source of the assessment is stated along with the EEMU for each course outcome. [1, 2]

The report allows for longitudinal assessment of the program outcomes. The SWE faculty created the program outcomes prior to any FCAR production. A complete mapping of the SWE curriculum to the specific program outcome was determined using 1) courses introducing the outcome; 2) courses using the outcome; and 3) courses mastering the outcome. This map provided the specific program outcomes that would be assessed in each of the courses in the SWE curriculum. For example in the above sample FCAR, SWE 4324 was mapped to SWE program outcome #5 and #10. The program outcome section 6 of the FCAR uses a 4-tuple performance vector called EPAN to categorize course performance of those who passed the course. EPAN represents the number of students that were Exemplary, Proficient, Apprentice, and Novice based on specific performance criteria for the program outcome. A longitudinal analysis can be performed with all the FCARS of the courses that were mapped to the specific program outcome. The question "How much did our students improve their skills in this program outcome from freshman level to graduation?" can be assessed. [1, 2]

## CONCLUSIONS

The Software Engineering Department is involved in the challenge of seeking accreditation from ABET. A major component of this quest is the current ABET Criterion 3 which revolves around the course and program outcomes; and the assessment for these program outcomes from the course objectives. The Faculty Course Assessment Report (FCAR) is a process which includes a prescribed evaluation of the collected metrics and a vehicle for continuous improvement in the next iteration of the course offering. The effective use of FCARS within the SWE department should lead to a more consistent standard of teaching, learning, and assessment. One of the visible improvements that were realized was an outstanding commitment from the local software engineering industry to participate in formulation and improvement of our capstone course. This course was targeted to assess the mastery of most SWE program outcomes.

Our SWE faculty has found the FCAR to be an effective documentation tool used in course and program outcome assessment. It provided standard departmental documentation of the modification made to the program at the course level and contained recommendation for future course improvements. The "closing the loop" process is accomplished in three levels, 1) at the course level it serves as clear documentation of what occurred; 2) at the program level reviews of FCARS give insight to possible curriculum action items; 3) for the instructor it is a place to document inspection and reflection ideas for the future. This paper clarifies what is the FCAR report and explains the content of the report with a sample. Other programs in need of an assessment tool can use this paper as a jump-start.

## REFERENCES

- [1] Miller, R. L. and B. M. Olds, "Performance Assessment of EC-2000 Student Outcomes in the Unit Operations Laboratory", 1999 ASEE Annual Conference Proceedings.
- [2] Estell, John K., "Faculty Course Assessment Report (FCAR) Instructions," *Best Assessment Processes VI*, Rose-Hulman Institute of Technology, March 2004, pg. 23-28.
- [3] [http://pages.towson.edu/assessment/how\\_to\\_assess\\_well.htm](http://pages.towson.edu/assessment/how_to_assess_well.htm)

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Barbara Bernal Thomas is a full professor in the School of Computing and Software Engineering at Southern Polytechnic State University (SPSU) for the last 20 years. Her primary teaching areas are Software Engineering, User-Centered Design, and Computer Graphics & Multimedia. Barbara is directly involved in the Usability Center at SPSU which accepts projects and partnerships with industry (web site: [usability.spsu.edu](http://usability.spsu.edu)). She is involved with computer educational support for local businesses in the Atlanta area through Software Education & Support (her consulting company). She does specialized software development and evaluation as a consultant. Professor Thomas has given numerous papers, tutorials and presentations locally and internationally on Human-Computer Interaction and Software Engineering. She is currently the ASEE Southeastern Section Proceedings Editor.