Assessment Strategies: Coordinating Assessment for Multiple Accrediting Bodies

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ABSTRACT

This paper explains the tasks associated with creating an assessment process that can be used to assess data for multiple accrediting bodies. The paper provides information on the role of an assessment committee and how that committee can steer a department into an organized assessment team. Planning, data collection, report generation, continuous improvement, and faculty buy-in are discussed. Example documents for performing assessment tasks are included.

INTRODUCTION

Assessment is not just the latest fad in education. Assessment is the key to accreditation, whether the accreditation sought is program-specific or university-wide. Some of the challenges for assessment are (1) understanding what to assess, (2) determining how to assess, and (3) calculating how frequently to assess. This paper explains a process used by a computer science and information systems department in a small liberal arts college in the southeast. The department is responsible for not only reporting assessment data for the Southern Association for Colleges and Schools (SACS) [7], but also for the Accreditation Board for Engineering and Technology (ABET) [2]. In order to meet the assessment requirements, several different methods and reports were being produced from an unmanageable amount of collected data. For several years, the department has been learning to streamline the assessment process and is one of the leading departments in the university in terms of organized assessment strategies. While assessment certainly remains an on-going, evolving process, the department has matured to a point where assessment is no longer feared. Assessment has become part of the department culture. The tools and techniques used to streamline this process are provided in this paper for other departments that need to report assessment data in a multi-faceted fashion.

This paper is organized in the following manner: An explanation of the types of accreditation responsibilities of the department is provided. This is followed by an account of the tasks required by an assessment-focused committee in the department. The next few sections provide details on how to plan an assessment strategy, collect data, and report the data. Finally, a discussion on continuous improvement and faculty buy-in is presented. Future work and outstanding tasks complete the paper.

ACCREDITING BODIES AND RESPONSIBILITIES

The department of computer science and information systems is a department in a university that is regionally accredited by SACS, the accrediting body for higher educational institutes in the southeastern United States [7]. University-wide, each department must maintain yearly accreditation statistics which are then used to evaluate the university as a whole. The Bachelor of Science in Computer Science is

accredited by ABET. The Bachelor of Science in Information Systems is a new degree in the department and will be evaluated for accreditation by ABET once a certain level of accreditation data has been gathered.

In previous years, the department would gather assessment related data such as student course grades, exit examinations, and exit surveys. When the yearly university-wide reports were due, the challenge of writing the report clearly showed that changes in the process were necessary. The reports were cumbersome to write because while data existed, the data collected was not mapped to specific goals ahead of time, making assessment reporting somewhat like a large jigsaw puzzle. In addition, student grades were not translated into more useful information.

This method of assessment tracking and reporting changed when the department started preparing for the renewal of the ABET accreditation for the Bachelor of Science in Computer Science. ABET was moving to a new set of standards and it was important the department was able to keep up with the new standards. During the 2008 academic year, preparation and training to redesign the accreditation methods of the department began. The department formed a small assessment committee that would steer the department into a new way of thinking about assessment. During that year, the chair of the assessment committee attended a rigorous training with ABET as well as best-practices workshops in the months following. In addition, the assessment chair reviewed and shared a series of webinars provided by ABET. The training provided the department with an individual who could be a "go-to" contact person for assessment-related questions. This individual then relayed the most important information back to the assessment committee members, and eventually the faculty.

During the 2009 academic year, the assessment committee worked to design an assessment plan that would fit both the ABET and SACS requirements. The following sections provide the steps taken to achieve that task.

THE ROLE OF THE ASSESSMENT COMMITTEE

The assessment committee first began as appointed junior faculty members. Later, four new faculty members joined the department. Two had experience in ABET accreditation and volunteered to join the assessment committee. A year later, another new faculty member was hired in the department who was also interested in assessment.

The assessment committee would not be successful without a certain amount of power to make changes. The assessment committee meets as needed and has the authority to implement changes to departmental processes. It also has the final say in assessment-related decisions. Most importantly, it has the support of the department chair. In addition, the assessment committee regularly incorporates assessment-related agenda items for inclusion in regular departmental meetings. This allows the rest of the faculty to be updated in assessment matters.

While a seemingly simple task, there was also a need to understand and map the different naming conventions used in assessment. For example, what the university calls "student learning goals" are called "course objectives" by ABET. Since all university departments are required to use the same nomenclature for SACS-related reporting, all assessment terms used in the department eventually followed the university-wide terms.

Once naming conventions were clear, the assessment committee took on the task of creating customized ABET-related student learning outcomes, which are currently referred to as ABET Program Curricula Outcomes (PCOs) within the department. These are based on the required criteria for the different

programs either accredited by or being targeted for accreditation by ABET [1]. This was an extremely difficult task as the committee customized each of the ABET student learning outcomes for both the computer science and information systems degrees. In order to fulfill a university-wide requirement for SACS accreditation, the assessment committee needed to update the department mission statement along with the goals of the department.

The assessment committee then needed to map each of the ABET-related PCOs with the SACS-related goals. Once the PCOs were mapped to the goals, the assessment committee needed to work on what ABET considers performance criteria [4], which are now referred to course objectives (COs) within the department. These are individual, measurable tasks that are assessed within the program. For each PCO, the assessment committee, in conjunction with the faculty, created COs for each PCO. For each class, no more than four COs were applied. Faculty could choose from the official list or modify the COs for their class as long as the COs were mapped to the PCOs. The official COs were also evaluated in the Senior Exit Exam, which is explained in detailed in a future section of this paper.

In order to assist faculty in understanding the relationships between the PCOs and COs, a master document was created for each class. It contained a matrix of how each CO mapped to each PCO. Initially, an attempt was made to limit a one-to-one mapping, but that was abandoned due to some overlapping concepts. At the beginning of the semester, each faculty would review their matrix to determine what PCOs should be covered. An example can be found in Appendix A.

ASSESSMENT PLANNING

The assessment committee created a six-year plan of assessment to determine which PCOs would be assessed during the assessment plan. The assessment plan is modeled after ABET recommendations where a PCO is assessed twice during an assessment plan. The steps for assessing a PCO include (1) data collection, (2) evaluation of collected data, and (3) action or modifications. By assessing a PCO twice during a six-year plan, any necessary action can be taken mid-way through the assessment period, if necessary. Appendix B shows the rotating schedule of PCOs during a six-year plan.

The assessment committee, as part of the assessment plan each year, selected a rotating schedule of which PCOs were to be assessed by which classes. The PCO matrices were used to determine which classes could be candidates and eventually used in assessment. An attempt was made to avoid the same class or professor being targeted more than once in the same semester.

Since the goal of assessment is to determine what graduating students are expected to learn, no first-year courses were included in the assessment. The exception to this is the ethics course. This course was originally a junior-level course, but it was changed to be open for all computer science and information system majors from year one so that students could be introduced to ethical topics early in their academic career. In addition to the courses, the Senior Exit Exam is used to assess data every major semester. Appendix C shows the source of data for each PCO being assessed.

DATA COLLECTION

At the end of each semester, all courses must be evaluated using a Simple Faculty Course Assessment Report (Simple FCAR), a popular standardized format for assessing course-related data. The FCAR was adopted from [5] and includes not only grade reporting, but a reflection of how well the course covered required topics. A Simple FCAR also includes sections for changes made from previous experience as well as future suggestions. Faculty had been used to completing the simple FCARs for several years.

A new, more detailed FCAR was introduced to specifically address the PCOs being measured in targeted classes. All professors are made aware of which classes are being assessed approximately one semester in advance. The Detailed FCAR includes a section that is used to specifically evaluate the targeted PCO. Information in the Detailed FCAR includes all sections from the Simple FCAR in addition to a course objective assessment section. In this section, the faculty member indicates how the Course Objectives mapped to a particular PCO are measured. This evaluation could be, for example, a particular question from an exam or an entire assignment. The choice is always left up to the instructor.

The instructor then determines a measurement of satisfaction for the item being evaluated. The goal of this is to move away from using course grades as an assessment measurement. This measurement of satisfaction can change depending on the type of assessment. In terms of an exam question, a score of satisfaction can be as simple as getting the answer correct. When using more complicated measurements, a score of satisfaction might be a particular grade on an assignment. For whatever score the faculty member determines is satisfactory, those students meeting the criteria are used to create a satisfaction ratio. This is a ratio of the number of students who successfully met the CO versus the total number of students in the class. That ratio, along with an explanation of how that ratio was determined is included in the Detailed FCAR.

In addition to FCARs, other methods of assessment are included. These include national standardized testing, alumni surveys, and the senior exit exam. While these and additional methods can be incorporated into any assessment plan, the most important of these for this particular department is the senior exit exam. The senior exit exam provides both a direct and indirect assessment of each and every PCO. There are several parts of the senior exit exam. One part is a survey that asks the student to measure the strength of coverage of each of the COs from the official list of COs mentioned earlier. Following the coverage-based assessment of each CO, survey questions assessing the students' ability to perform each CO are presented. Finally, knowledge-based questions that were mapped to each PCO are included. These questions ranged from determining program output to answering factual questions based on various computer science or information systems topics.

The Detailed FCARs, the survey-based senior exit exam questions, and the knowledge-based senior exit exam questions provide the department with the ability to triangulate assessment. Triangulation involves assessing based on three different categories of assessment. The Detailed FCARs as well as the knowledge-based senior exit exam questions are two forms of direct assessment. The senior exit exam survey questions represent indirect methods of assessment. The goal of the assessment committee is to always have at least two direct and one indirect method of assessment. As previously stated, other assessment methods can and are included from time-to-time, but at a minimum, the each PCO is assessed on the detailed FCAR, survey-based senior exit exam questions, and the knowledge-based senior exit exam questions.

REPORTING ASSESSMENT

For each targeted PCO, an assessment score is determined. This assessment score is derived by compiling all of the ratios of students who successfully satisfied a particular CO from all data sources. The ratio is then converted to a four-point scale. This allows reports to be written with a simple, mathematical representation of the assessment data collected. For areas that score lower, attention is needed.

Because of the careful planning of the assessment committee, report generation is much less painful than in the past. Instead of attempting to keep track of two different reporting systems, the assessed data can

be used in both ABET-related and SACS-related reports using the assessment scores and supporting data gathered throughout the six-year plan.

CONTINUOUS IMPROVEMENT

The goal of assessment is to continuously make improvements to the program. Once Detailed FCARs are submitted, senior exit exams are taken, and reports are written, the assessment process does not end. The department gathers at the end of the spring semester to review the FCARs for the year and to discuss assessment results.

Since assessment improvements should not be delayed for discussion a single time during the year, the assessment committee continuously reviews the assessment data as it becomes available. While the assessment committee takes the lead on reviewing the PCO-related data, there are other tasks that are simply too much for a small committee to handle alone. One of the most important areas that needs to be managed is the coverage of PCOs via the mapped COs for each course. If an instructor does not provide assessment data for the PCOs for their course, the committee is limited to other sources for assessment. While the overlapping of assessment using triangulation from different sources helps avoid related problems, checks are still required.

In a department where different instructors often teach different courses each semester, it is essential to maintain clear guidelines on what PCOs are to be covered by each course. This is done by a course coordinator, a concept introduced by [6]. A course coordinator is responsible for updating PCO coverage and communicating any changes of coverage to the assessment committee. The course coordinator is also responsible for meeting with all other instructors who are teaching a course they coordinate to ensure that new instructors target the required PCOs. In addition, the course coordinator ensures that textbooks used are appropriate for the class. By having a course coordinator responsible for each course in the curriculum, there is a "go-to" person for each course. The course coordinator has the ability to determine if the PCOs listed in each course matrix actually apply the course.

FACULTY BUY-IN

In order for assessment to be successful, there must be faculty buy-in. Assessment does not work if only a select few perform the necessary tasks. The culture of a department must change to, if not an assessment-friendly culture, an assessment-accepting culture. The key is to ensure the continued communication of the importance of assessment to all faculty members. The assessment committee is tasked with trying to promote change, especially to those who are most resistant. The process of creating an assessment-friendly culture is something that takes time and cannot be forced.

Course coordinators are, when possible, chosen based on interest so that there will be a sense of "ownership" on the part of the course coordinator. This is to help keep course coordinators motivated to continuously focus on improvements to the curriculum. In addition to the selection of course coordinators, the rotating schedule of courses helps keep the same faculty from constantly being burdened with providing a Detailed FCAR every semester. This is done, in part, to keep faculty from experiencing "assessment burn-out" by sharing the assessment load among the faculty.

Online support tools are also extremely useful for assessment strategies. In order avoid constantly meeting with faculty, many initiatives can be achieved via email or Web portal. Instead of inundating faculty with printouts and booklets, FCARs, reports, schedules, and other assessment-related information

can simply be made available via electronic tools. In addition, a bulletin board with a listing of helpful information such as target dates, and course coordinators is located in a visible location.

FUTURE ASSESSMENT PLANS

While the department has become efficient in performing assessment, there are still goals to be met. In addition to course coordinators, the department also implemented outcome champions. Outcome champions were also based on [6] to ensure that each PCO was being measured properly. The idea of the outcome champion never fully materialized and the tasks of ensuring assessment data coverage fell back onto the assessment committee. Ownership of a particular PCO by a faculty member is still a goal, but implementing this goal is on hold until the end of the first assessment cycle is complete. At that point, it will be important for outcome champions to help determine if curriculum changes are needed.

In addition to the Web-based repository and email communication currently being used in the department, more technology-based programs must be implemented. Currently, syllabi, matrices, and FCARs are still disseminated as word processing documents. While these documents are uploaded for online access, many assessment-related systems should be replaced with database driven electronic tools. Because of a lack of staffing, progress is slow, but improving. Assessment committee members are taking on this task by programming the most essential online tools between semesters.

APPENDIX A

This appendix provides an example of the mappings for each course objective against the ABET Program Curricula Outcomes for a particular course.

CSCI 480

Introduction to Artificial Intelligence. (3) (Prereq: CSCI 220) Covers the fundamentals of Artificial Intelligence (AI); topics and techniques for analyzing and developing intelligent systems; programming in an AI language. Coverage may include applications in areas such as expert systems, neural networks, fuzzy logic, robotics, etc. F, even years.

Each matrix will map the course objectives to the following Program Curricular Outcomes:

a) An ability to apply fundamental principles of computing and mathematics
b) An ability to analyze a problem, and identify and define the requirements appropriate to its solution
c) An ability to design, implement, and evaluate a solution to meet specific requirements subject to a set of constraints
d) An ability to function effectively on multi-disciplinary teams to accomplish a common goal
e) An understanding of professional and ethical responsibilities
f) An ability to communicate effectively, both verbally and in writing
g) An ability to analyze the local and global impact of computing on individuals, organizations, and society
h) Recognition of the need for and an ability to engage in life-long learning
i) An ability to use current techniques, skills, and tools necessary for computing practice Computer Science
j) [CS ONLY] An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems through the critical analysis of the tradeoffs involved in design choices
k) [CS ONLY] An ability to apply design and development principles in the construction of complex software systems
l) [IS ONLY] An understanding of processes that support the development, deployment, and management of information systems within a business-centric application environment

Course Objectives
The student will be able to:

1) Describe the fundamentals of artificial intelligence including knowledge representation, reasoning, problem solving and machine learning
2) Analyze problems that can be solved using AI
3) Apply artificial intelligence programming techniques in a modern programming language

Course Objectives Mapped to ABET Program Curricula Outcomes

	PCO												
CO		a	b	c	d	e	f	g	h	i	j	k	l
	1		X										
	2		X								X		
	3			X						X			

APPENDIX B

PCO	Description	Year 1 09-10	Year 2 10-11	Year 3 11-12	Year 4 12-13	Year 5 13-14	Year 6 14-15
A	An ability to apply fundamental principles of computing and mathematics	X		X		X	
B	An ability to analyze a problem, and identify and define the requirements appropriate to its solution		X		X		X
C	An ability to design, implement, and evaluate a solution to meet specific requirements subject to a set of constraints	X		X		X	
D	An ability to function effectively on multi-disciplinary teams to accomplish a common goal	X		X		X	
E	An understanding of professional and ethical responsibilities		X		X		X
F	An ability to communicate effectively, both verbally and in writing		X		X		X
G	An ability to analyze the local and global impact of computing on individuals, organizations, and society	X		X		X	
H	Recognition of the need for and an ability to engage in life-long learning		X		X		X
I	An ability to use current techniques, skills, and tools necessary for computing practice Computer Science		X		X		X
J	[CS ONLY] An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems through the critical analysis of the tradeoffs involved in design choices	X		X		X	
K	[CS ONLY] An ability to apply design and development principles in the construction of complex software systems		X		X		X
L	[IS ONLY] An understanding of processes that support the development, deployment, and management of information systems within a business-centric application environment	X		X		X	

APPENDIX C

PCO	Description	Year 2 10-11	Year 3 11-12
A	An ability to apply fundamental principles of computing and mathematics		CSCI 445 (F) CSCI 415 (S) Exit Exam (F & S)
B	An ability to analyze a problem, and identify and define the requirements appropriate to its solution	CSCI 370 (F) CSCI 220 (S) Exit Exam (F & S)	
C	An ability to design, implement, and evaluate a solution to meet specific requirements subject to a set of constraints		CSCI 350 (F) CSCI 450 (S) Exit Exam (F & S)
D	An ability to function effectively on multi-disciplinary teams to accomplish a common goal		CSCI 330 (F) CSCI 335 (S) Exit Exam (F & S)
E	An understanding of professional and ethical responsibilities	CSCI 170 (F) CSCI 385 (S) Exit Exam (F & S)	
F	An ability to communicate effectively, both verbally and in writing	CSCI 330 (F) CSCI 410 (F) Exit Exam (F & S)	
G	An ability to analyze the local and global impact of computing on individuals, organizations, and society		CSCI 370 (F) CSCI 495 (S) Exit Exam (F & S)
H	Recognition of the need for and an ability to engage in life-long learning	CSCI 409 (F) CSCI 430 (S) Exit Exam (F & S)	
I	An ability to use current techniques, skills, and tools necessary for computing practice Computer Science	CSCI 310 (F) CSCI 425 (S) Exit Exam (F & S)	
J	[CS ONLY] An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems through the critical analysis of the tradeoffs involved in design choices		CSCI 356 (F) CSCI 480 (S) Exit Exam (F & S)
K	[CS ONLY] An ability to apply design and development principles in the construction of complex software systems	CSCI 450 (F) CSCI 490 (S) Exit Exam (F & S)	
L	[IS ONLY] An understanding of processes that support the development, deployment, and management of information systems within a business-centric application environment		CSCI 409 (F) CSCI 495 (S) Exit Exam (F & S)

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