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Multidisciplinary Approaches: A Management Core for Applied Managment and Decision Science

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Abstract

The new management core curriculum was launched at South Dakota State University in 2012 designed for programs at the institution affiliated with decision sciences, applied management and economics. A task force of business and industry leaders working with faculty developed a set of key competencies for graduates from management-related programs. Based on those competencies, an ad hoc group of multidisciplinary faculty in the Colleges of Engineering, Agriculture and Biological Sciences, Education and Human Sciences, and Arts and Sciences designated a four-course sequence named the Management Core to address key elements of the competencies. The undergraduate Operations Management program, housed in the College of Engineering, is preparing for accreditation under ABET – Applied Sciences Accreditation Commission (ASAC) and has adopted the management core. The competencies developed by the external task force are reflected in the program educational outcomes. Department faculty accomplishes data collection on student outcomes and continuous improvement.

Our challenge has been in working with departments in other colleges to design and execute an assessment plan for the courses in the Core that will meet divergent accreditation requirements. Philosophical differences on assessment, concerns about additional work to collect and organize outcome data, and faculty governance have been points of departure. To address these issues, a multidisciplinary Division of Economics and Management was formed which includes a Faculty Advisory Committee empowered to develop a framework for cross-disciplinary collaboration in course delivery and assessment. In recent weeks, engineering faculty have conducted workshops on outcome assessment and continuous improvement based on the ABET model for faculty in other colleges. This has produced better understanding of the assessment process and the value in well-designed outcome measures.

This paper provides insight on the challenges and rewards of multidisciplinary curriculum development framed against ABET-ASAC accreditation requirements.

Introduction

As engineering educators, we are charged with preparing students for their future professional careers by delivering the curriculum, experiential learning activities, and informed guidance. The curriculum element generally encompasses foundation, core, and elective courses in the discipline complemented by general education requirements. We verify the efficacy of our work via student learning and program outcomes, alumni surveys, employer surveys, and certification/exit exams and ABET accreditation reviews the program against its criteria. Throughout this process, the message is that this body of work is appropriate, meaningful, and has value in the marketplace.

Increasingly, engineering education is challenged by its constituent groups to provide a more rounded curriculum particularly including 'soft' skills sets in workplace communication, leadership, team building, project management, and personal effectiveness.[1] Teaching these skills to our students is often challenging because there is not a straightforward correct answer, students fail to see the connection to their future career, and lecturing on these topics is generally found to be ineffective.[2] While it is difficult to find labor data on the number of degreed engineers who enter the managerial ranks over time, there is anecdotal evidence that many engineers opt for a management-related advanced degree over a technical degree.[3] For most, the path to promotion is into management as most companies lack a technical advancement ladder.

Applied Management Across the Curriculum

In 2008, SDSU President Chicoine formed an Economics-Management Task Force, a group of business and industry leaders with a vested interest in enhancing and expanding the image and efficacy of programs in Economics and Management. The E-M Task Force was organized in three key areas: finance, economics, and management. The Management Subgroup collaborated with SDSU faculty to define the skills and attributes future managers needed to be successful in dynamic workplace environments. The following are the expected competencies for an applied management program graduate should possess:

1. Be analytically proficient with a demonstrated capacity to understand risk, interpret information, and put theory into practice to develop a workable solution.
2. Able to communicate effectively with all levels of an organization using appropriate technology and interpersonal skills.
3. Able to effectively manage their time and the resources at hand, meet deadlines, delegate and/or accept additional responsibility when appropriate, and be adaptable to the evolving needs of the organization.
4. Ability to work independently or as a member of an integrated team; is capable and willing to motivate, organize and lead others in a team or group setting; and, is able to build positive workplace relationships across cultural and generational differences.
5. Have an understanding of global perspectives and their impact of change on the organization as well as an appreciation for corporate culture, history, and traditions.
6. Have a solid an understanding of the strategic planning process, business plans, personal and organizational goal setting, leveraging resources, and the ability to use these tools effectively in the workplace.
7. Understands and abides by the code of ethics for their respective profession, deals fairly and honestly with co-workers and customers, and is cognizant of procedures, regulations or rules governing human resource management.[4]

It is important to note the commonalities underlying these management competencies. All build upon core management premises of planning, organizing, leading, and controlling resources whether it is human resources, natural resources, financial resources, or material resources. For the practitioner, these functions have evolved over the past 150 years as technological, social, economic and even political systems have become more complex and interrelated. At SDSU, these relationships fall under the unifying theme of applied management and analytical rigor.

Analytical Rigor

A quality education includes mastery of substantive knowledge, development of analytical thinking skills or sense making, and practical reasoning or judgment based upon the particularity of a situation which gives an analysis purpose.[5] Analytical thinking focuses upon synthesis of knowledge and data analysis in the development of conclusions or proposals that can be used to formulate an appropriate action or response. Analysis without knowledge is meaningless and judgment without analysis risks inappropriate action or response.

Academic rigor is the level or extent to which students are asked to develop their knowledge, analytical skills, and judgment. Analytical rigor is, therefore, a subset of academic rigor. Analytical rigor involves the use of discipline specific analytical tools and methods, additional information form a variety of perspectives, and synthesized knowledge to make sense of data and provide explanations, recommendations, or conclusions that can be used by decision makers. The rigor can be assessed by establishing the risks associated with shallow analysis and developing a level of analysis that corresponds with an acceptable level of risk.[6,7]

Multidisciplinary Approach

The need for a collaborative, multidisciplinary approach to applied management was driven by internal constraints as no single program unit had adequate staff resources to deliver an applied management course sequence. Our vision was to enrich multiple programs across four colleges with distinct needs, strengthening all units and providing a unique setting for faculty research and outreach collaborations.

The result was to unite under a transitional Division of Economics and Management (DEM) with an interim director, a faculty advisory council consisting of representatives from each discipline tasked with developing governance, an operations committee comprised of department heads and advisory committee representatives, and a board of deans to guide strategic decisions and provide fiduciary oversight. The DEM is expected to serve as an interim vehicle for cross-college cooperation as we develop course delivery and assessment plans, work toward accreditation, and establish multidisciplinary research teams. Faculty are maintained in their home department for evaluation, promotion, and compensation purposes but are encouraged to work with peers in the DEM on competitive grants. Ultimately, the DEM is expected to evolve into a School or College of Management while retaining the cross-departmental reporting structure.

Within the College of Engineering, mathematics and statistics, operations management, and construction management have been organized under the descriptor Decision Sciences and Applied Management. The undergraduate operations management program is a relatively new program built upon the former Industrial Management and Manufacturing Engineering Technology programs that were folded together in 2011. The updated Operations Management program has manufacturing and electronics emphases with most students enrolled in the manufacturing track. The program has been designed around the general criteria for ABET –

Applied Sciences Accreditation Commission and over the past three years, we have worked to continuously improve the program.

Program Assessment Process

In the Operations Management program, we look at assessment as being a large part of our process of achieving ABET accreditation of our program. Since 2000, the ABET accreditation process has been outcomes-driven which generally are described as what students are expected to know and be able to do by the time of graduation. ABET-ASAC Criterion 4, Continuous Improvement states: "The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program"[8]. The act of defining outcomes, determining if they are met, and making changes if they are not can become a paper-pushing exercise. However, in our program, we strive to look at the assessment process as a way to improve student learning. As Baehr stated, "Simply put, assessment is a process used for improving quality"[9].

The B.S. in Operations Management program defines for each course 2 to 5 student outcomes, based on the ABET-ASAC Criterion 3(a)-(k) requirements, to be measured in that course. The outcomes are measured by assessment instruments - homework, quizzes, tests, labs, papers, reports, projects, etc. - that are a part of the standard course offering. Rubrics are developed for each instrument, and are used to measure if the students are meeting the goal set. The assessment information is gathered for each course in an Excel spreadsheet that is available to all faculty in the department on a shared network drive. Each course has a tab in the spreadsheet for recording information each semester. A summary of all the assessment data is updated each semester. The department Undergraduate Program Coordinator is responsible for updating and maintaining the spreadsheet and developing the summary, but department faculty provide assessment data each semester. All program faculty participate in the continuous improvement portion of the assessment process. There is, at minimum, one faculty meeting at the beginning of each semester to review the results of the outcomes assessments for each course from the previous semester, to refine the assessment instruments if necessary, and to decide on the action that will be taken if an assessment goal is not met.

Divergent Perspectives on Assessment

An interesting challenge for College of Engineering operations management faculty in the past year has been developing an agreed upon process to execute our outcomes-based assessment plan outside the department. Faculty in the Economics department deliver three of four management core courses for the university and we previously encountered resistance from this unit on collecting assessment data citing concerns about the amount of work required to gather and organize this information. Their reticence to adopt course objectives and outcomes was baffling until it was determined they were largely unfamiliar with outcomes assessment.

To remedy this, the DEM interim director asked a faculty member from Engineering to conduct a short presentation on program planning and assessment for the DEM faculty advisory council members and help facilitate a two day workshop on expected student outcomes for Economics faculty at the end of the spring 2014 semester. In addition, the new accreditation criterion

prescribed for the Economics department also requires outcomes assessment. The result is more open discussion of the assessment process and it has helped the DEM faculty advisory council and faculty members teaching management core courses establish preliminary course objectives and outcomes for the management core. The data will be usable for ABET-ASAC accreditation needs as well as parallel accreditations in Economics and Hospitality Management.

Summary

It is normal for faculty to prefer working with colleagues in the same discipline area and focus on assessment and continuous improvement activities that will benefit their respective programs. Opening communication and collaboration channels across discrete professional program lines can be challenging, particularly when combining applied and engineering sciences with business and the social sciences. For this institution, it is too early in the process to declare victory, but we are well on the way in establishing a creative, supportive and entrepreneurial culture between programs affiliated with our Division of Economics and Management.

The opportunity to enhance our programs and student learning experiences with content and projects that are generally delivered in business management programs is a plus. We are meeting our constituents' expectations for graduates that are technologically skilled, analytically competent, and have a broad understanding of the performance expectations in the contemporary workplace.

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