

Transforming the CREDLE (Capstone Research Experience for Distance Learning Executives)

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Abstract

In today's changing world, professionals have to be content experts, as well as highly skilled problem solvers, team players, and lifelong learners. These professionals also need to be taught with the industry needs in mind. Ignoring this will produce graduates who are not meeting the changing needs of the industry. A real-time project based learning approach is very useful to satisfy the two primary goals: life-long learning and syncing with current industry needs. However, the challenges are manifold while doing a capstone project via distance education, especially for a large class size. Managing such class becomes challenging because an instructor has to play a critical role in defining the research question as he or she needs to measure all the skills and competencies that the student has developed during the course of the project, and at the same time be able to produce something useful the student's company. This paper presents an innovative approach for enhancing student learning outcomes in Capstone class in a distance based program. It discusses different aspects of the teaching methodologies used in the course such as content creation, setting up the deliverables to make sure the student stays engaged with the course and assessments to evaluate students on their level of competencies.

Introduction

Industrial Distribution (ID) program at Texas A&M University is schooled at the Engineering Technology and Industrial Distribution (ETID) department. The ID program offers an undergraduate (BS) degree in and a master's degree (MID). MID is a distant learning program. It is a 21-month, part-time, cohort program designed for working professionals. The majority of the students who enroll in the program hold management positions in medium to large size companies. It is one of the flagship online programs of College of Engineering. The MID program has seen its enrollment grow since its inception 11 years ago. Currently, the enrollment in both cohorts is approximately 140 students. The program is targeting 200 students by 2018.

The MID curriculum includes courses in Logistics, Information Systems, Operations Management, Financial Accounting, Human Resources and a Capstone project. All these courses have distribution industry focus. There are two residency weeks in the entire length of the program: one each at the beginning of the first and second year. In the global distribution class, the students visit international companies and work on real-world case studies from the companies they visit. The focus of research in this paper is on the capstone project.

The student selects a capstone project, usually from the company he/she works. The capstone project thus addresses a real managerial dilemma that the company faces. The student forms a steering committee comprising of a faculty member and representatives

from his/her company. A successful execution of the capstone project thus provides a high-value solution to the company's problem. Even though, the capstone project is registered as a three-credit course for a single (graduating) semester, the student starts working on their projects at the beginning of the second year.

A new pedagogical approach needs to be instituted to manage the capstone project's increasing needs due to the growth that the MID program is experiencing. When the enrollment was low, two-three students were advised by a faculty. Currently, each faculty advises 9 to 11 students. The amount of involvement of faculty with each student as result increases. The faculty advisor is involved in helping the student to develop the problem statement, report writing, picking the right methodology and helping in gaining the managerial implications, and finally presenting the results to the management of the student's company. Attending to the needs of each student in such a short period of two semesters is demanding.

The capstone project is presented as the core value proposition for students in the MID program. The idea is that companies can avoid paying external consultants to obtain the same solution, which can be provided by their employees working on their MID degree. Moreover, after graduation, these employees become internal consultants to their companies. The Return on Investment on the student's tuition is realized within two to three years by a company. To maintain the quality of the capstone projects and value proposition, a new methodology needs to be developed that will accommodate the growing needs of the program. and yet The faculty advisors should effectively guide, instruct, and help students to complete a quality project in such a short period. In the following sections, we discuss how our innovative teaching methodology addresses the problem.

Most of the students neither have a background in academic research nor possess skills required for writing formal reports. To be successful in the capstone project, the students ought to have knowledge in the above two aspects. The onus is on the faculty advisor to ensure that the student learns the fundamentals of business research and formal writing while working on the capstone project. This is not a viable strategy when the program size continues to grow. Hence much is needed to transform the way the capstone project is executed. The challenges the faculty faces with respect to capstone project are plenty. 1) How can the students' effort in conducting actual research is not slowed down due to their lack of understanding of business research process? 2) Can we leverage the face time the faculty have during the residency week to set and manage expectations?, 3) How can the faculty makes sure that the students have the right skill set to manage and execute their projects in a self-directed manner, where the faculty's role is limited to directing the student's.

The objective of this paper is to present an innovative approach for enhancing student learning outcomes in Capstone class in a distance based program. The methodology proposed in this paper not only helps the students to successfully complete their projects but also transforms their educational experience to new level. In the following section, we describe various approaches adopted in managing the MID Capstone course and their

impact on student learning outcomes. That include integration of capstone course with other MID classes, faculty student assignment, executing the capstone projects, and result of the student learning outcomes assessed by the industry advisory board.

Integrating Capstone Project with Other Classes

Our experience of over ten years of running a distance based executive Master's program suggests that a capstone project cannot be completed with meaningful results and learning experience in one semester, or even in two semesters if they are not properly planned and executed. We have found that linking the capstone course with another research based course has helped students tremendously in identifying the problem early on thereby leading to successful completion of the project on time. In the following paragraphs, we present a residency class that is linked with the capstone project to illustrate our proposed pedagogy.

The title of the residency course is "Distributor Process I" (it is worth noting here that Distributor Process II is our Capstone Project class). The residency week class is a week-long research based course designed to enhance the students' learning experience in business research methodology. It is offered in early August on campus as a part of the second year MID curriculum. In this course, students learn how to perform a literature review, prepare problem statement, design an unbiased data collection plan, and identify an appropriate analysis methodology. While the focus of the course is primarily on the applied research problems facing the distribution industry, students are allowed to choose their own research problem depending upon their interest and organizational background. The course is divided into two phases. Phase I represents (pre-residency week) activities in which students prepare a pre-proposal for their capstone project. In Phase II (residency week), students are involved in several activities related to the best practices in business research methodologies. Depending upon the class size, the residency week may include a one-day visit to a local company / case study as an exercise to formulate research questions based on a real-world problem. Alternately, instructors can develop teaching case studies based on real-world problems to aid the student learning.

Course Objectives

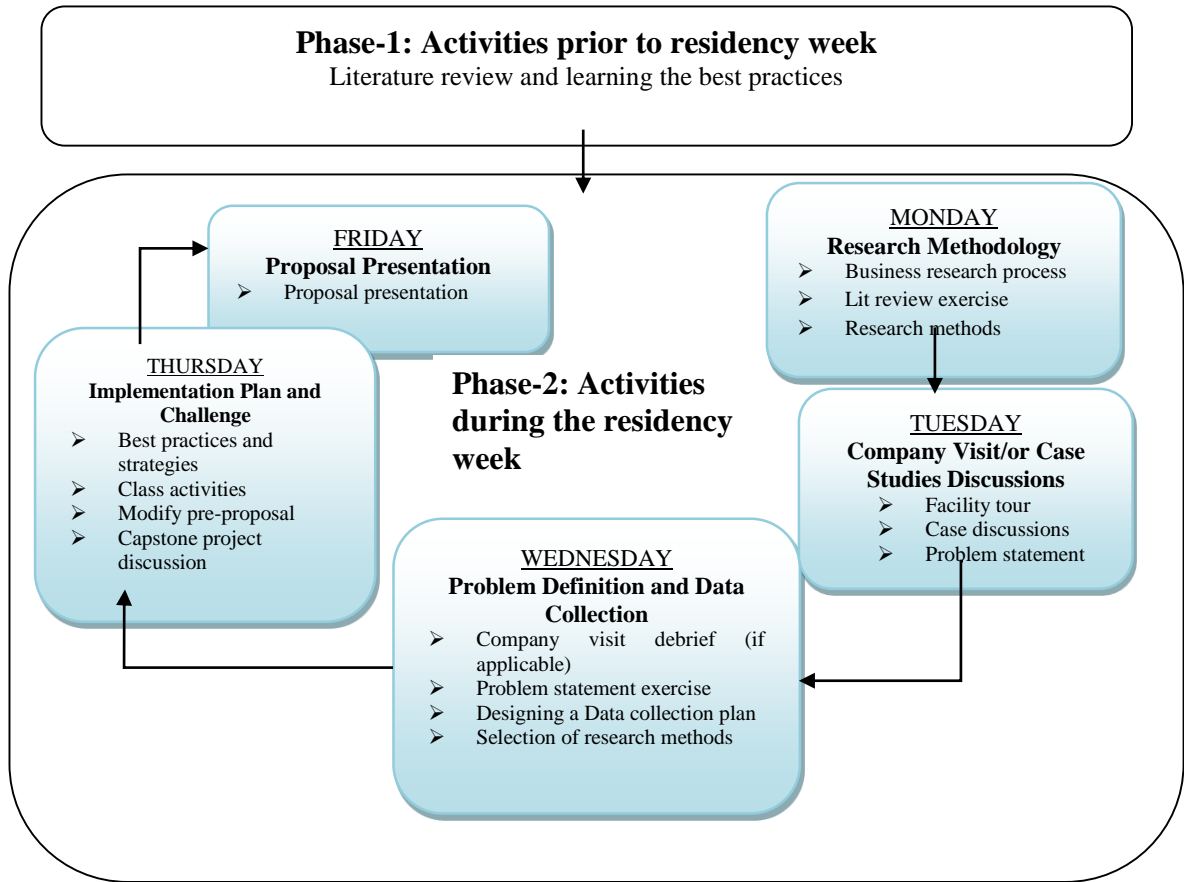
- The objectives of the Distributor Process I course are to provide the students with sufficient exposure and training to perform applied research in their post-graduation career in general, and carry out their capstone projects in particular. Upon successful completion of the course, students will be able to: Demonstrate the systematic thought processes used in scientific thinking and assessment of current industry practices
- Apply scientific research approach to an industry problem
- Select appropriate data type and scales for measuring industry data
- Identify, describe and implement the key steps in a large scale project proposal preparation including problem identification, literature review, methodology, data collection plan, expected findings (business case), as well as delivering a written and oral presentation of their project proposal and findings

- Perform an independent research project in the future capstone project.

Course Activities

As mentioned earlier, this is a three-credit course offered in the beginning of the second year of the MID program during the residency week. It is designed as a weeklong intensive course in which the students work from Monday through Friday, 8:00 AM to 5:00 PM with after-hours group meetings and other studies. Exhibit 1 depicts the design and schedule of the course.

Exhibit 1: Class activities for prior to and during the residency week



The figure demonstrates that the actual course learning process starts prior to residency week. Prior to the residency week, each student prepares a 10-page long pre-proposal describing what they want to do for the capstone project. The pre-proposal includes a problem statement, review of related literature, research methodology, expected results, project implementation strategies, and list of references. Students are provided with a detailed section-by-section guidelines on preparation of pre-proposal. While it is not mandatory, we strongly encourage students to select research problem for the capstone project from their place of employment. These projects create opportunity to save the company significant costs and improve profitability. For those students who cannot get

the problem from their company, the instructors can help find the external sponsors. In the event external sponsors are not available, the students will be working on their own topic of interest. However, such topics have to be approved by the advising faculty before students begin the work.

During residency week, on day 1 (Monday), in the morning, the students will begin the session by learning the business research process. In this session, they learn how they can translate a management dilemma to an executable research question(s). The afternoon session covers literature review and referencing styles. Since many graduate students have no research background prior to coming to the program, are unaware of purpose and methods of conducting and reporting a good literature review. This is the most critical, step in their research process.

On Tuesday, faculty discusses the case studies. Students are exposed to several real-world issues facing distributors and supply chain management organizations. The main idea here is to provide an experiential learning environment for students. Once the case and management dilemma facing companies are discussed, students are asked to begin formulating research plan starting with a brief relevant literature review, research questions, and formulation of a problem statement for their research. Alternately, instead of teaching case studies, the instructor can take students to a local company and work on the company problems.

On Wednesday, the class debriefs faculty on their findings of case studies, or what they saw at the company facility they have visited... The focus of the discussion is on the potential project opportunities. Students are asked to formulate a problem statement based on their understanding of the issues faced by the case study companies. In the afternoon, the class focuses on data collection and analysis methodology and the associated challenges. Students are exposed to different distribution processes along with discussions on potential data sources for their project. They also learn about how to select an appropriate research methodology depending upon the nature of the project and available data type.

On Thursday morning, the class focuses on project management including project implementation challenges and best practices. Discussions include issues and potential organizational changes as a result of new project implementation. Students will learn both strategic tools and tactical approach to manage the implementation process. In the early Thursday afternoon, the students meet with the instructors, and other faculty to discuss the execution of their capstone project. On Friday, they present the analysis of their case study to faculty and the class in which they are expected to apply all the knowledge, research processes and tools that they have learned over the week. The end goal of these week-long activities is to provide the students with a complete experience of research process so they have the background necessary for their Capstone project.

. Matching Faculty with Students

In the past, when there were fewer students, students always had the chance to work with the faculty they wanted to. However, with the increasing number of students this practice has become impossible. One of the most important problems with larger class sizes is to balance faculty workload while assigning students for the capstone project. As expected, students' preferences might not facilitate a balanced workload among faculty. While some faculty may see a lot of students being interested in working with them, some others will have fewer interested students. Consequently, it has become a major issue to make sure that there is some kind of balance among faculty workload in order not to overburden some faculty. Students are communicated this fact and they prepare a list of three faculty members whom they would like to have as capstone project advisor. Having a preferred list of faculty as advisors from each student helps MID program to better manage faculty resources.

Students are encouraged to talk to faculty and find a faculty who agrees to advise the project beforehand. However, communicating with faculty is not a requirement and, with larger class sizes, it has become a challenge for students and faculty to schedule a time to discuss potential project during the residency week.

After students submit their lists, MID Program Director analyzes the list and goes through the list using a few guidelines. First, students are matched to their first choice if there is a mutual interest between faculty and student. Then remaining students are assigned to MID faculty based on faculty expertise and students' priority while making sure that each faculty has roughly the same number of students to advise.

Setting up Milestones and Engaging Students

One of the initial tasks done by faculty is to set up an advisory committee by the help of students. Advisory committee consists of the faculty advisor and two to three individuals from students' place of employment. Students are encouraged to reach out to individuals who are in (upper) management positions and have interests in the project and its outcomes. The faculty advisor may also include other faculty or research associates in the program.

Students start working on their capstone project as soon as the Fall Semester begins. Their first task is to prepare a proposal draft. Typically students use the pre-proposal developed during the residency week to prepare the proposal. The faculty advisor provides the initial feedback for the draft and he/she schedule a management meeting to have students present their capstone proposals. During this meeting, the advisory committee and the student determine the scope of the project and they set the expectations about deliverables. In addition, the faculty advisor talks to the other committee members, clarifies expectations regarding providing feedback, and requests their help to especially facilitate data collection within the organization.

While each faculty determines the exact schedule for projects he/she advises and details the list of deliverables, they all follow a common template for deliverables. In most cases, students are required to submit their report once a month progressing towards the final

report. The monthly deliverables begin with a detailed problem statement, and expanded further by addition of a literature review, project methodology, data collection or experiment design, finding conclusions, and managerial implications. Faculty provides feedback and grade for each deliverables throughout the capstone project. As we discuss in the following paragraphs, students also receive feedback through peer review and/or research meetings. A student going through these milestones will have his/her final project at the end of the semester. Finally at the end of spring semester, students give a 50-minute talk to MID faculty, industry guests, and their peers. When the advisory committee members cannot travel to the campus, students make an additional presentation to their advisory committee in advance.

While above stated deliverables and corresponding schedule are common, there are variations among faculty in terms of how they communicate with students, additional expectations and responsibilities. Some examples are online office hours, monthly research group calls, and peer review/evaluation. Faculty uses these tools to make sure that students are successfully progressing toward the completion of a capstone project, faculty and students' time efficiently and effectively used, and students learn from the experience of others.

Online office hours make sure that students have access to the faculty on a regular basis. Having a scheduled time for faculty access, allows the faculty to use his/her time more effectively due to the fact without a scheduled time remote learning students tend to think that faculty must be accessible any time during a week. In addition, it opens a communication channel for students to reach out to the faculty early in the process rather than waiting until the next deliverable is submitted.

Peer review process has been a very effective tool to provide students with additional learning opportunities by allowing them to be involved in classmates' projects and learn about the problem, methodology, and results, which is most likely significantly different from their own problem. Students are usually asked to evaluate two reports for each deliverables, which are randomly assigned. Students provide critical feedback and grading is still done by the faculty. Peer review allows each student to receive feedback from multiple people. Along the same lines, some faculty organize monthly research meeting online. These meetings are usually scheduled during lunch time or another time that is convenient for the majority. Each student has 8 to 10 minutes power point presentation to show what has been done since the last meeting and receives feedback. These research meetings are designed to provide students with an opportunity to develop presentation and critical thinking skills.

Results

Faculty perception is that changes implemented during the last two years have made the large number of capstone project manageable while improving the quality of the projects through multiple stream of feedback mechanism and further improved students' skill set for presentation and business research projects. The companies involved have been satisfied with the quality of completed projects. However, it is more important to them

that they have one of their employees trained to work on projects. That saves them several thousands of dollars in consultant fees. This model has also been looked at the College of Engineering as a model for strengthening university and industry ties. The faculty are also able to work with the industries closely to develop better contacts.

As mentioned earlier, students present their final capstone presentation to the MID advisory board, several faculty, and industry representatives. The advisory board has evaluated these capstone outcomes to be very rich. The average evaluations from the advisory board are shown in Exhibit 2.

Exhibit 2: Industry Advisory Board Evaluation of students based on university learning outcomes

Student Learning Outcomes	Average Score (out of 5.0)
1A: Student demonstrates a basic knowledge of the technical aspects of Industrial Distribution	4.6
1B: Student demonstrates a basic knowledge of the customer service aspects of ID	4.59
2A: An ability to function effectively as a leader or a member in a technical team	4.4
2B: An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature	4.17
2C: An understanding of the need for and the ability to engage in self-directed continuing professional development.	4.45
2D: A commitment to quality, timeliness and continuous improvement	4.5
3A: Graduates will have successful careers	4.6
3B: An ability to conduct applied research in ID and Supply Chain Management	4.5
3C: An understanding of the need for and an ability to engage in self-directed life-long learning	4.5

Conclusion

The redesign of the capstone course required a significant amount of effort. The efforts have been put in gradually learning from each revision for the expectations. The redesign of the course required significant planning and preparation from the faculty. Though the time and efforts have been significant, the student enhancement that comes from this structured approach, especially in an online degree program, has been several folds. This helps the students achieve greater efficiencies of learning and produce a much better final product. This has become an experience that has been enriching the students, the faculty and the industry involved.

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