

Extended Abstract - Connecting the Start to ... Finish

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Abstract - The vision of this project is to connect the first year experience course, ME 101- Introduction to ME, to the capstone course, ME 574/575 - Industrial Design Project I/II. The idea is that this connection would allow the student to envision themselves completing the program, by making the end tangible and achievable rather than something off in the future. This connection would also allow the students to ask themselves “is this what I want to be doing in four years”. The connection between the courses is made in two ways. The first is to engage the first year students in a team project that is an “immature” version, of the “mature” version they will complete, in ME 574/575 Senior Design. Just like in the capstone course, the first year students are taught teaming skills, brainstorming, project planning, leadership, decision making, oral presentations and written reports of their design project. These topics, with their application to the design project, allow the first year students to connect ideas and principals with their engineering education to become the successful engineer they sat out to be. The second method of connecting the first year students to the senior course is the use of the senior students as mentors for the teams. Each team is assigned a senior to guide, advise, encourage, and “big brother” the team members. The mentors also act to review and provide feedback on a series of oral and written design reviews. The outcome of this project, from both the first year students and the senior mentors, has been very positive.

Index Terms – FYEE, Course Connections, Design Project.

OVERVIEW

The vision of this project is to connect the first year experience course, ME 101- Introduction to ME, to the capstone course, ME 574/575 - Industrial Design Project I/II.

THE START

ME 101 is a required first year experience course for all students in the Mechanical and Nuclear Engineering Department (MNE) at Kansas State University. The course can be broken down in to three broad categories:

- Orientation
- Technical content
- Design project

The first block of content, the Orientation, is as the name implies an orientation to the University, College, MNE Department as well as the engineering profession.

The second block of content, the Technical content, provides an introduction to various areas of study within the MNE program as well as some basic knowledge and skills used in engineering i.e. units and graphing.

The third block of content, the Design Project, has been a tradition within the course. The intent of this content is to allow the students to have a hands-on activity that gives them a “taste” of the design process, wetting their appetite for things to come. It is the modification of this third block of content that is to be discussed in this paper.

THE FINISH

The “Finish” is ME 574/575 Industrial Design Project I/II. This course is a two semester capstone course for the MNE program. ME 574/575 is an industry sponsored, team based project course. The students are lead through the design process, and the study and application of soft skills such as teaming and communication.

THE CONNECTION

The intent of this course restructuring project, as stated earlier, is to connect the first year experience course to the capstone course. The idea is that this connection would allow the first year students to envision themselves completing the program, making the completion of the MNE program tangible and achievable rather than something way off in the future.

The connection between these courses is made in two ways. The first is to engage the first year students in a team project that is an “immature” version, of the “mature” version they will complete, in ME 574/575. The second method of connecting the two courses is the use of seniors in ME 574/575 as mentors for the ME 101 project teams.

I. Connection Method One: Mimicking Capstone Course

For the ME 101 design project to mimic the ME 574/575 design project, additional content was added and the structure of the project was modified. In ME 574/575 a number of topics are covered to support the team design project. Some of these topics include:

- Design Process
- Concept generations methods
- Concept Evaluation
- Project Planning
- Personalities and Teams
- Conducting Effective meeting
- Effective Communication
- Leadership

To provide commonality and thereby connecting the two courses the topics listed above were added to the ME 101 course. Not only did these topics provided tools the ME 101 students could use on their design project, these topics also provided a common basis for discussion between the ME 101 teams and the mentors. It is also anticipated that by introducing these topics at this early stage, rather than the senior year, the students will benefit by the application of this knowledge throughout their college careers.

The process of reviewing project progress of the ME101 design projects was also restructured to mimicking the ME 574/575 process. In ME 574/575 the students participate in several meetings with the sponsors, the first of these is a Kick-off meeting, followed by four Design Reviews spaced through-out the two semesters. At the Kick-off meeting the student team meets the sponsor company contact and the team is given details of the project. Once the project is underway the teams meet with the sponsors for Design Reviews at each midterm and end of the semester. At each of the Design Reviews the team participation includes an oral presentation and a written report.

The ME 101 design project was restructured to include a Kick-off and Design Reviews, mimicking the ME 574/575 course.

For the Kick-off meeting, all of the teams are gathered into a large meeting room. The mentors are assigned to a team and they meet with their team for introductions. Once the teams have had an opportunity to “meet and greet” the details of the design project are disclosed. The teams and mentors are then given time to discuss and start planning the project.

Throughout the semester the students are given deadlines for hosting Design Reviews for their mentors. At the first Design Review the students are expected to give an oral presentation in which they discuss the problem statement, proposed timeline, and potential solution paths. In the second Design Review the students are expected to give an oral presentation provide and update on project status they also provide a written report for evaluation. The third Design Review is the final evaluation and this review is with the course instructor. This review includes an oral

discussion of the project, a demonstration of the completed project and a written report.

To assist in providing a more balanced and consistent evaluation of each team’s performance, the mentors are provided an evaluation rubric for the project design, oral presentation and written report.

Throughout the semester the instructor continually connects the Start to the Finish. This is accomplished by describing to the ME 101 students the projects/companies the ME 574/575 students are working on, as well as comments on the senior Design Reviews.

II. Connection Method Two: Senior Mentors

The second method of connecting the Start to the Finish utilizes seniors enrolled in ME 574/575 as mentors for the ME 101 design teams. The seniors volunteer to be mentors and enroll in a zero credit hour course ME 699 - ME101 Mentor. This connection provides benefits to both the mentor and mentee. The ME 101 student mentees benefit in obvious ways, someone to be a “big brother/sister,” someone to look up to, someone showing the way, someone to ask questions, and someone that will provide encouragement and creditable peer evaluation. The senior mentors also benefit through the opportunity to lead and evaluate, honing these important soft skills in the less threatening environment. This opportunity also allows them to see from the other side of the table. In the mentor role they are the ones being presented to and they are the ones doing the evaluating. In their role as a team member in ME 574/575 they will be the ones presenting and the ones being evaluated.

PROGRESS AND PROBLEMS

The restructuring of the ME 101 course has been ongoing over the past three years, being fully implemented last fall. The goal of connecting the two courses appears to be effective and there has been positive feedback from students from both ME 101 and ME 574/575.

Currently consideration is being made into an effective metric to assess the project. All assessment to date have been subjective in nature.

One noted critical factor in the process is the effectiveness of the mentor. An ineffectiveness mentor paired with a team comprised of at-risk team members can create a negative culture resulting in an uphill battle to regain the confidence and enthusiasm of the team.