

# A Comprehensive Outcome Assessment Based Final Year Projects for Undergraduate Engineering Programs at Universiti Tenaga Nasional (UNITEN)

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## Abstract

This paper discusses the development of an outcome based learning and quality assessments of final-year projects for Bachelor Engineering Degree within the College of Engineering at Universiti Tenaga Nasional. Based on the findings obtained from a survey conducted amongst the staff in the College of Engineering, an exercise to revamp the learning outcomes, quality and implementation of the projects was undertaken. The objectives of the exercise are two folds; primarily to create an outcome based learning via proper assessments, project management and soft skills among students and secondarily to maintain and standardize the assessment criteria across the college while maintaining the quality of the projects. This will ensure the objectives of final year project; which is to enhance the student's technical knowledge and soft skills in solving problems through engineering based projects will be achieved. The paper will discuss on two major aspects, namely the assessment methods developed to enhance the learning outcome and the online tool for the centralized management and monitoring of progress of student's projects. The issues of objectives and outcomes, assessment instruments and tools, marking criteria, methods of good practice, awarding creativity and innovation, and addressing on-line Final Year Project Management Tool and implementation and monitoring of Final Year Project methods are discussed.

*Keywords: project assessment; on-line Final Year Project Management; outcome based learning; quality; creativity and innovation*

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## 1. Introduction

Undergraduate students in engineering face a challenge in which they will need more than just solid technical background to succeed [1,2]. In achieving design targets and objectives, they will be expected to interact effectively with people of widely social, ethnical and technical backgrounds. The interaction here not only includes technical knowledge, but the soft skills in delivering this technical knowledge. As it has been reported many times in the local press regarding our local graduates are lacking in soft skills, namely oral and written skills. Hence it was part of the obligation of the academics in UNITEN to ensure that the graduates that leave UNITEN will have superior soft skills to what we are offering now. Besides this, lately there has been talk on outcome based learning, in short how can individual courses be tailored to fulfill the expectation of

employers. Since outcome based learning is becoming a global trend, we Malaysians should start to embrace it.

The faculty members of the College of Engineering found that the most effective way of enriching the soft skills yet at the same time preparing our graduates for the working world is via the final year projects. It was decided that the final year projects in the college should be structured not only to address the issue of soft skills, but at the same time to have an outcome-based learning approach that in some way simulates the working world into a classroom scenario. Hence, this paper discussed and presents the new procedures and evaluation methods adopted by the College of Engineering in UNITEN to address the issues raised earlier.

## 2. Structure and Phases of the Final Year Project

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The aim of the final year project is to enhance the student's knowledge and skills in solving problems through engineering based problems. The objectives of the projects are four folds, namely at the end of the project the students are expected to have:

- The capability to complete projects within the stipulated period and cost.
- The capability to manage and use scientific knowledge to carry out engineering projects
- The capability to think objectively, analytically, and critically in identifying and solving problems in a systematic manner.
- The capability to deliver or present the project findings in oral and written form.

The final year project consists of two parts; the first part is Project 1 which is taken as a prerequisite to the second part, Project 2. Both Project 1 and Project 2 are one semester long projects respectively. As displayed in Figure 1, Project 1 is broken down into three phases, whilst Project 2 consists of two phases. The phases were scheduled in accordance to how most engineering projects are handled in real working life scenario.

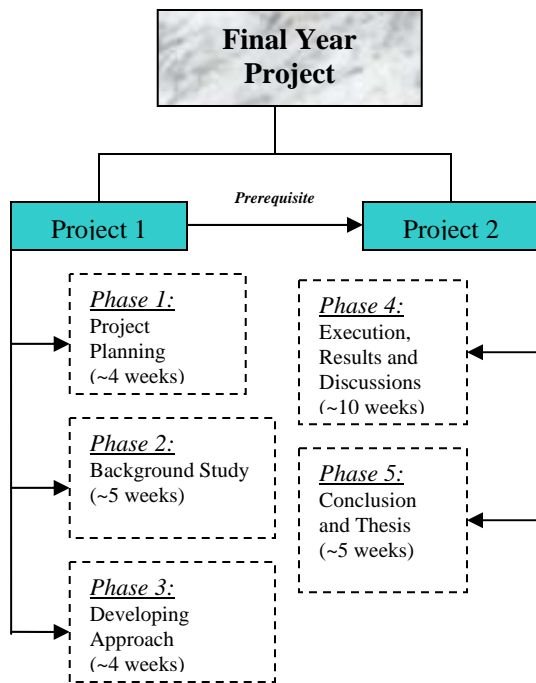


Figure 1. The phases within the final year project

In Phase 1, the student is required to submit a written report at the end of the phase. The report will contain a brief scene setting introduction to the context of the project. This will be followed by a clear statement

of the project's objectives (general) accompanied with a project plan in some appropriate diagrammatic form with milestones. The objective of this phase and its report is to lay the foundation of the project with proper understanding of what is needed from the project. Besides this, the report will serve as a mutual agreement between the supervisor ('client') and the student on what is expected from the student.

Phase 2 of the project, which is in Project 1, deals with intensive background and literature review by the student. Here at the end of the phase, the student is required to submit a progress report which details the summary or findings from the background study conducted and how this study is related to the project's objectives. By the end of this phase, the student will be able to redefine or refine the project objectives and define scopes within the objectives of the project.

Once the background study has been completed by a student in Phase 2, the student will proceed to Phase 3 of the project, which is to identify proper work procedures or approaches for the project. Here again the student is required to submit a progress report at the end of the phase. The report will contain discussion on the work procedures, analysis and approach. The student is also encouraged to provide some critical insights on the expected output of the project based on the literature review conducted.

In Phase 4 of the project, which is in Project 2, the students will execute their work procedures developed in Phase 3. At the end of this phase, the student is required to submit another progress report describing and discussing the results/ outcome obtained from the projects. Towards the end of the project, which is Phase 5, students are required to tidy up their projects and to submit their thesis. The preliminary draft of the thesis basically comprises of all progress reports submitted.

### 3. Evaluation

As any other course, proper evaluation is necessary as a means of examining the level of student's contribution, understanding and performance in the course. Below is the detail description on the evaluation criteria for both Project 1 and Project 2, respectively [3].

- Project 1
  - Project Proposal 15 %
  - Progress Report 1 20 %
  - Progress Report 2 25 %

- Oral Presentation 25 %
- Logbook 10 %
- Conduct of Task 5 %
- Project 2
  - Progress Report 3 % 15
  - Oral Presentation 15 %
  - Logbook 10 %
  - Conduct of Task 5 %
  - Quality of Project 10 %
  - Thesis 45 %

*Project Proposal* is basically the report submitted at the end of Phase 1. The report will be examined for the capability of the student in defining project objective(s) with an appropriate project plan.

*Progress Reports* 1 – 3 are reports submitted at the end of Phases 2 – 4 respectively. Below is a description of these reports:

- *Progress Report* 1 will be examined for the quantity and quality of the background study along with the capability of the student to relate the findings to the project objectives.
- *Progress Report* 2 will be focused on assessing the students in developing and identifying work procedures and analysis for the project. The student will also be assessed on the capability to predict the expected outcome from the project.
- In *Progress Report* 3, the student will be assessed in the ability to present and discuss results and outcomes from the project.

*Oral presentations* will be done for both Project 1 and Project 2. During the oral presentation, the students will be assessed on:

- The ability to use presentation tools, attire, and time keeping
- The ability to communicate orally ( language, fluency and flow or presentation)
- The ability to discuss concisely and briefly about the technical work.
- Sensitivity towards questions

For *logbooks*, students are required to maintain a logbook. The purpose of the logbook is to log in ideas, findings, problems, potential solutions, drawings and any other matter that is pertaining to the project. The logbook will be evaluated on the adequacy of its content as an acceptably good preliminary report, and on the organization and the tidiness of the logbook.

*Conduct of task* is generally the supervisor's (lecturer) perception on the student's attitude towards the project. The student has to maintain a positive and enthusiasm outlook in the project in order to achieve a high score under this assessment. Here we are trying to develop a sense of responsibility, eagerness and a right attitude in solving engineering projects.

Under *Quality of Project*, assessment will be done to evaluate the end product of the project in terms of innovation, creativity, quality and effectiveness. This will not be tied to the thesis, but rather it will stand alone.

In the *Thesis*, the following will be assessed:

- Presentation of Thesis
  - Physical setup and tidiness of thesis
  - Suitability and continuity of chapters
  - Language and grammar
- Technical Work Achievements
  - Overall planning and approach by the student towards the problem
  - Final outcome/ results of the project
  - Fulfillment of the project objectives

For each evaluation/ assessment stage, appropriate feedback will be given to the students. This is to ensure that students are aware of their mistakes and to better understand on how to communicate both oral and written, especially when it comes to technical subjects.

To facilitate the new guidelines, an online tool for the centralized management and monitoring of progress for student's projects was devised. This online tool management system provided has many useful features which include:

- Submit/modify/delete project titles
- To ability for staffs and students to view all titles submitted
- Fairer title selections by students (first come first serve basis)
- Assign examiners to students
- Easier grade entry for supervisors.
- Easier real –time tracking of project assessment marks
- To reduce the usage of papers
- Allowing archiving marks, grades and titles for easy viewing and for future analysis.

The online system will be easy to monitor the procedures and datelines set for the projects, both for the students and lecturers.

#### 4. Conclusion

From the structure and the evaluation developed for the Final Year Projects, it can be concluded that not only are our students being exposed to intensive report writing and oral presentations, they are also being trained to develop necessary skills such as project management, time management, ability to think objectively, analytically, and critically in identifying and solving problems in a systematic manner. These are important elements needed when it comes to the real life working scenarios.

Thus far, the outcome from these new procedures are positive whereby students are getting more involved with their projects and are able to understand what is expected from them at a very early stage. This was not so visible before. Hence, it is the aspiration of the college of engineering of UNITEN, that all of these procedures and evaluations developed will help to mold our students to be a more reliable and marketable engineer with developed technical and soft skill as required by the potential employers.

#### References

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- [3] *Final Year Project Guidelines for College of Engineering, University Tenaga Nasional*, May 2005.