Student Project Administration at a Research Laboratory

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Overview

- Student Project (Why?, What?, How?)
- Measuring successful project (Why?, How?)
- Parameters associated with student project
- Model to predict project success
- Experimental Results
- Conclusions

Student Project - What?

- Student projects are an essential part of a four year graduate course in most universities world wide
- In most Indian universities the project in an Engineering discipline is mandatory and
  - is spread over a period of two semesters (part time) for a graduate course (8 - 10 hours a week)
  - for a post graduate course it is spread over a period of one semester full time (30 hours a week)
- At the end of the project duration the student is assessed by a panel of examiners and awarded a suitable grade.

Student Project - Why?

In the Indian scenario the basic aim of such a project is to give

- necessary industrial exposure to the graduating students
- exposure is deemed necessary in order to bridge the transition gap between university education and a professional job
- the project benefits both the student and the industry
- is a welcome aspect of the education process

Very often the project plays an important role in what job offers a student gets ...

Student Project - How?

Ideally,

- student adviser is a full time member of the research staff at the Laboratory
- students spend a sizable amount of time discussing the project plan and related issues with the adviser
  - 15 % of time is spent to invoke continued interest in the project,
  - 35 % time spent in day to day discussions (planning and evaluating results)
  - 20 % in evaluating project reports from the intellectual property rights (IPR) angle

Student Project - How?

- 5 % of time in planning the infrastructure and making available the necessary computing and logistics facilities
- remaining time goes in keeping oneself updated
  - about the progress elsewhere in the research community
  - finding possible extensions to the project plan to make the project output more useful and current

Successful Project - A Definition

Success of a student project is difficult to define because

- especially when it is setup in a research environment,
- the probable outcome is difficult to predict

A successful project is defined

- the project is brought to a *logical conclusion*
- gives the adviser a sense of *satisfaction*
- makes the student motivated to *continue* similar studies in the future
- fetches *good* grades

Why Measure a Project

Several Reasons

- students get better grades
- students are inclined to work in *research* areas
- advisers time spent has tangible output

More importantly,
Management of the research lab is assured that the time of the adviser is well spent!

Features that measure success

- Features identified based on statistics
- Features derived from projects undertaken by
  - 29 students
  - from 6 different colleges
  - over a 25 month period
- Features categorized as
  - *essential* and
  - *non-essential*

  in terms of driving a project towards success

Features that measure success

- Essential
  - Clarity of problem definition
  - Team Availability: full time or part time
  - Team Size: defined as small (< 3) else large.
  - Project Background: details available at the start
  - Team cooperation: assignment division
  - Motivation: excitement within the team
  - Adviser Time: extent of guidance on an ongoing basis
  - Team composition: Boys or Girls or mixed.

Features that measure success

-
  - Prerequisites: required for the project
  - Interaction: with other members of the laboratory
  - Targets being set: short goals so focused results
- non-essential
  - Skill set: of the team depending on the project. For example programming skills for an implementation project.
  - Data availability if the project needs it.

Reference Data used for Modeling

No	Coll	# Studts	Course	FT/PT	Prfm (30)
1	Coll A	5	Grad	PT	14.2
2	Coll B	6	Grad	FT:	18.8
3	Coll C	3	Grad	PT	25
		5	Post Grad	FT	29
4	Coll D	4	Grad	PT	11
5	Coll E	3	Grad	PT	23
6	Coll F	1	Grad	PT	11
7	Coll G	1	Grad	PT	11
Overall	6	29			18.58

Features from Reference Data

	Feature	Weights
c_1	Problem Definition	0.13
c_2	Full time and dedicated team	0.11
c_3	Small team (size 2/3)	0.08
c_4	Background of the project clear	0.08
c_5	Team cooperation	0.08
c_6	Team excitement	0.05
c_7	Good and continued guidance	0.11
c_8	Girl team	0.03
c_9	Students have prerequisites required	0.05
c_a	Lab Interaction	0.09
c_b	Short goals	0.12
c_c	Programming skills	0.07

Model to Predict Project Success

Based on the reference data, a linear model for a successful project was derived as

$$\begin{aligned} f(c) &= 0.13c_1 + 0.11c_2 + 0.08c_3 + 0.08c_4 \\ &+ 0.08c_5 + 0.05c_6 + 0.11c_7 + 0.03c_8 \\ &+ 0.05c_9 + 0.09c_a + 0.12c_b + 0.07c_c \end{aligned}$$

$0 \leq f(c) \leq 5.0$	Failure
$5.1 \leq f(c) \leq 6.0$	Moderate Success
$6.1 \leq f(c) \leq 7.0$	Success
$7.1 \leq f(c) \leq 9.0$	Good Success
$9.1 \leq f(c) \leq 10.0$	Super Success

Need for Modeling

- accessing the outcome of a project is desirable
- it is crucial because
  - the overheads associated with a student project on the laboratory is quite large in terms of resource usage and research staff time
  - a decision can be taken
    - A student project predicted in the category *Success*, *Good Success*, *Super Success* are the projects that can be initiated
    - the rest can be shelved until the right combination of the project and the students is found

Experimental Results

Prediction of the outcome of *in progress* projects

Student Project	Predict (Jul)	Observed (Oct)
Online to Offline	Success	Super Success
Online script recognition	Success	Good Success
Staff Management (Team 1)	Mod Success	Good Success
Staff Management (Team 2)	Success	Good Success

It can be observed that

- predictive estimate (Jul) have been lower than what they stood in Oct,
- suggests the model is pessimistic; fine tuning of parameters required to capture a more real model

Conclusions

- Student projects are essential part of engineering curriculum in Indian Universities
- Research labs spend resources to undertake these projects
- Ability to predict the success of a project helps research laboratories
- We derived a model to predict the success of a project
- Validated the model on several projects to measure the success of a student project

Thank You

- Queries?
- Comments
- Suggestions?

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