Impacts of Software Engineering Project Preferences on Student Motivation

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Introduction

To determine the impact of choices on a student's approach and enthusiasm, we conducted research surveys concentrating on the priority of their choices for software engineering projects. Our data consist of graduate and undergraduate software engineering class pre-semester and post-semester surveys. We evaluated the student motivation through several dimensions, including hours spent on the project outside of class as well as opinions and intentions with the project at the conclusion of the semester.

Problem Statement

Identifying the impact of software engineering project preferences on student motivation. The need for the research is to get an idea on how the projects should be assigned to the students.

Research Question

How does working on a preferred project help to improve student's motivation and dedication towards the software engineering project?

Significance

The idea behind the research was to helps the Software Engineering instructor identify the student's participation and dedication towards the assigned project. It also helps the instructor to obtain a basis for assigning the projects to the students as for how the first, second, third or none of the three choices should be distributed to the students.

Literature Review

Software engineering projects are designed taking into consideration the requirements for graduate and undergraduate classes. The duration for the project is set for a few weeks, which might play a crucial role in the student's dedication and willingness towards the project. We draw our references from '**POGIL**'. Process oriented guided inquiry learning-POGIL [3] believes in learn by the go. Students learn better themselves than being taught by a teacher. Software engineering courses are favorable to Project Based Learning- **PBL** [4]. Working on a project for a long period of time helps the students understand and implement the project efficiently by following the software lifecycle closely.

Further Work

Need to identify the parameters to incorporate with project preferences to perform further research. Continue working with other tests available to obtain a significance difference for the dependent variables.

Methodology

Undergraduate and graduate courses were the subjects of our study. After reviewing a list of approved projects, students were asked to rank three choices of their selection out of which one would be designated as the final topic of their software engineering project. We investigated whether students who were assigned to their top project choice were more diligent than those who were assigned to their second or third choices.

A. Coursework

The software engineering coursework is designed such that it might be a first semester long team project in the academic curriculum. It enables a student to utilize to the full extent their capability to work with different software languages. Teams were assigned weekly deadlines, by which they were expected to demonstrate successful execution of their software.

At the end of the semester, the teams are expected to present their final projects, which would be graded in accordance with their contribution and some inputs from the instructor. Teams are also supposed to maintain their code on the Github, which helps keep track of each member's contribution. Lastly, the projects are showcased on campus in public so the teams would get an opportunity to showcase their contribution and achievements.

B. Surveys

We collected pre-semester and post-semester project surveys for undergraduate and graduate classes [1]. The data was primarily focused on- is the student motivated by the problems associated with the products, the prospect of the project being successful with wide acceptance, and on the three project preferences submitted by the students. Our questions for the students concentrated mainly on how they made the choice, what the application of their project might be in the future, and the opportunities it offers in terms of professional/career network.

The surveys also concentrated on how the selected projects motivated the students towards their education, the society and the general good. It asked students on how much time they dedicated towards their project in class and outside.

C. Student Teams

Students in both undergraduate and graduate classes were assigned semester long projects to show how their projects related to software development techniques taught in class. Selection of project is a systematic process wherein students propose the project ideas; the instructor then vets the ideas to ensure its viability and suitability. Once approved, the students then take a pre-survey to determine three choices that top the list. Furthermore, grouping of students had to be done keeping in mind their current academic session, their project preferences and popularity of a certain project. All students were assigned projects from their choice of three preferences, but not all were assigned their first ranked choice.

Results

The data consist of undergraduate(n = 55) and graduate(n = 36) that is a total of n= 91 in which the number of students who got their first choice are between 30-80.Students who got one of the other (second, third or none of the three) choice are between 4-12. The number of questions tested is 27.

Columns	Mean	Standard Deviation	Shapiro-Wilk (p-value)
HoursPerWeek	7.56	6.12	p<0.05
PostContributingFOSS	4.42	0.85	p<0.05
PostPlanAndDevelop	4.5	0.62	p<0.05
PostListSteps	4.03	0.48	p<0.05
PostUseProcess	3.83	0.65	p<0.05
PostParticipateFOSS	4.23	0.65	p<0.05

Figure 1. Results from Shapiro-Wilk test

Columns	First_Mean	First_SD	Other_Mean	Other_SD	Wilcoxon-Mann-Whitney (p-value)
HoursPerWeek	8.52	8	6.58	3.62	0.7733
PostContributingFOSS	4.39	0.76	4.5	1	0.6622
PostPlanAndDevelop	4.5	0.67	4.5	0.58	0.8856
PostListSteps	4.06	0.72	4	0	0.8327
PostUseProcess	4	0.8	3.75	0.5	0.411
PostParticipateFOSS	4.22	0.79	4.25	0.5	0.9123

Figure 2. Results from Wilcoxon-Mann-Whitney test

The above tables show the test results for 6 out of the 27 questions. The statistical analysis includes Mean and Standard Deviation on the first and other choices. Other questions include PostMaintainFOSS, PostImpactComplexity, PostImpactSize, PostDescribeToolsTechniques and so on.
For each question tested the result is NOT normally distributed(non-parametric) for Shapiro-Wilk test as well as Wilcoxon-Mann-Whitney test.

Conclusions

The data we collected comprised of pre-semester and post-semester surveys for two semesters of undergraduate Software Engineering class with a total (n=55) and pre-semester and post-semester surveys for one semester of graduate Software Engineering class (n=36).

We ran Shapiro-Wilk test on each column to check if it fits a normal distribution. First choice($p<0.0001$) and Other choice($p<0.0001$) rejected the hypothesis that the distributions were normal. So we compared the results using Wilcoxon-Mann-Whitney test to compare the non-parametric distribution [1]. The test rejected the hypothesis hence stating that there is no significant difference since the p value is greater than 0.05($p>0.05$).

Considering the outcome of the tests performed, we came to the conclusion that Software Engineering Project Preferences do not impact student's motivation for working on the project.

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