

Impact of Past Project on the Educational Experience of Civil Engineering Students

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Abstract. Civil engineering lecturers need to develop effective early emphasis and educational challenges in order to prepare the current students with in-depth fundamental principles, applicable technical knowledge, and realistic appreciation on challenges faced by practicing civil engineers. In view of its importance, the use of past civil engineering projects as case studies have been integrated into the existing civil engineering curriculum at the University of Nottingham Malaysia Campus. In order to enhance our undergraduate students' understanding, cognitive learning desire, and overall learning experience, an additional module has been incorporated in the past five years to investigate major past civil engineering projects. Students are free to choose any of past projects as their case studies and are required to find, sort, synthesize, and present critical elements that contributed to the overall success of the past projects in the form of discussion essays. In this paper, the universal consensus between the lecturers and the students on the effectiveness of past civil engineering projects as case studies to enhance students' lifelong learning desire and aspiration towards ethical practice are investigated. The lecturers' and students' views on the extent of coverage of the key elements and the preferred disciplines from the past projects are furthermore evaluated. The outcomes indicate that the use of past projects as case studies enhanced students' educational experiences that conduce for cognitive learning desires (73% of lecturers & 81% of students), motivated for future ethical practice (82% of lecturers & 86% of students), and reassured aspiration (100% of lecturers & 97% of students) in becoming practicing civil engineers upon graduation. A common view derives from this study is that the curriculum needs to further its extent of coverage on the industry practices.

1 Introduction

In recent years, increasing complexities of civil engineering projects in the context of technical, organizational, regulatory, and economical requirements have been noted [1]. Therefore, civil engineering lecturers need to develop effective educational approaches that embed sufficient and appropriate challenges in order to prepare the current civil engineering students with in-depth fundamental principles, applicable technical knowledge, and appreciation towards realistic technical challenges faced by practicing civil engineers. These have become increasingly important as the rate of participation in worldwide universities increases [2], which in turn, increases the rate of diversity among undergraduate (UG) students. The diversity is not limited to their academic quality, but will be

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brought forwards with them into their professions [3]. In the context of civil engineering practice, these diversities can lead to significant adverse effects to the safety of the society.

In view of the importance of the quality of graduates and as a great challenge faced in engineering profession is engineering ethics [4], an early emphasis via means of specific module has been carried out in the University of Nottingham Malaysia Campus (UNMC) for the last five years to stimulate cognitive learning and motivate for future ethical practice via investigation into past civil engineering projects in the second year of its undergraduate studies [6]. Such practice is to ensure for the delivery of the paramount importance in undergraduate education [5], that is, the students' ability of identification of potential deficiencies through fundamental principles learnt during their year one, and with the aim to motivate for lifelong learning desire. Furthermore, this practice aims to make the students aware of the challenges faced and the advancements derived from past projects. Students are free to choose any past projects as their case studies and are required to find, sort, synthesize, and present critical elements that contributed to the overall success of the past projects in the form of discussonal essays.

In this paper, the universal consensus between the lecturers and the students on the effectiveness of past civil engineering projects as case studies to enhance students' lifelong learning desire and aspiration towards ethical practice are investigated. The lecturers' and students' views on the extent of coverage of the key elements and the preferred disciplines based on the findings from the investigation into past civil engineering projects are furthermore evaluated.

2 Methodology

Surveys in the form of questionnaire were conducted on eleven civil engineering academics, with five to twenty years of teaching experience, who have supervised UG students (Year 2) carrying out case studies in the form of essays into past civil engineering projects. The questionnaire used in this survey was designed to determine how influential is case studies on students' aspiration for an ethical career, continual lifelong learning desire, and educational experiences. Furthermore, the questionnaire was designed to evaluate lecturers' and students' views on the extent and the preferred disciplines for further integration. The survey results are summarized and analyzed in the following section in the form of pie charts and are compared with the previous results [6] from thirty-nine Year 2 and forty Year 3 students. Discussions of the results are, furthermore, presented. furthermore evaluated.

3 Analysis of Results and Discussions

Question (1): How do challenges faced by engineers involved affect students' aspirations?

The results (Figure. 1a) indicate that 100% of the lecturers believe the students would appreciate the challenges faced by engineers involved. Whilst, previous results [6] (Figure. 1b) on students' view indicate that 97% of the students take the challenges positively, while 3% take it negatively.

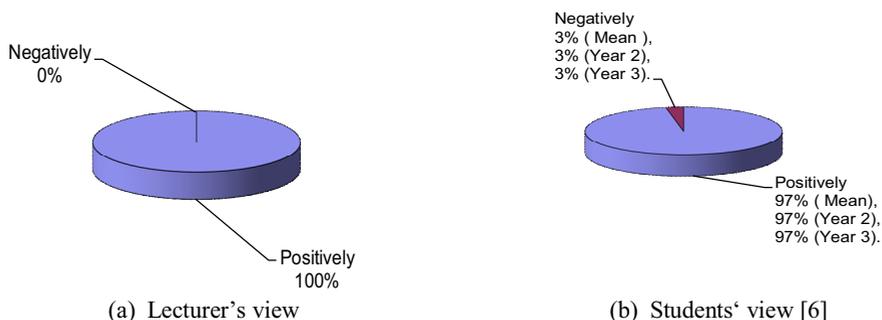


Figure 1. Lecturers' and students' views on students' aspiration in becoming practicing civil engineers.

Although there are 3% of the students did not take challenges positively, majority of the students took the challenges faced positively as expected by their lecturers. Such agreements between lecturers and students confirms the use of past projects motivate students' aspiration in becoming a practicing civil engineer.

Question (2): Does study /or investigation of past civil engineering projects motivate students in seeking for a better quality self-learning?

The results (Figure. 2a) indicate that 73% of the lecturers believe the students after investigation of past project would be motivated for a better quality self-learning, while 27% of the lecturers do not think so. Whilst, previous results [6] (Figure. 2b) indicate that 81% (74% of Year 2, 88% of Year 3) of the students were motivated for a better quality self-learning, while 19% (26% of Year 2, 12% of Year 3) of the students were not motivated.

Comparing with the lecturers' views, the students exceeded (8%) the lecturers' expectations on self-motivation for quality self-learning. Further analysis into these results indicates an increase in motivation for better self-learning as these students progress into their year 3. Such increase is believed to be attributed to the continual development of the students' technical competencies, and hence, the ability to recognize their limitations thus desire for quality self-learning.

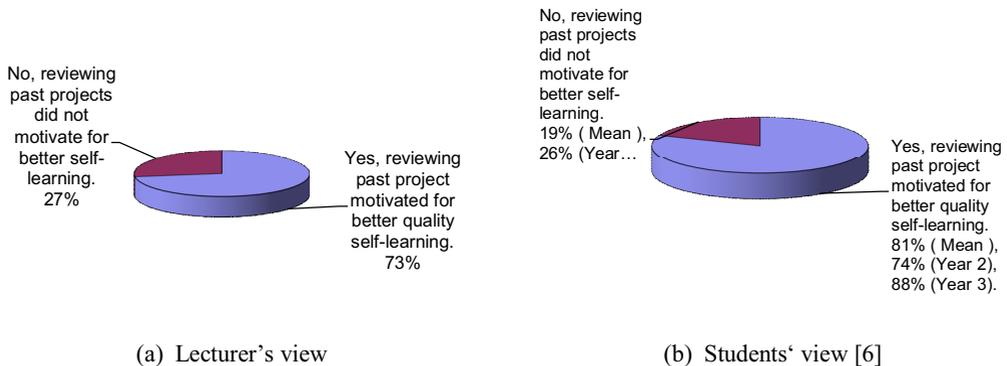


Figure 2. Lecturers' and students' views on students' motivation for better quality self-learning.

Question (3): Does study /or investigation of past civil engineering projects inspire students to practice ethically in their future career?

The results (Figure. 3a) indicate that 82% of the lecturers believe the students would be inspired for ethical practice, while 18% do not think so. Whilst, previous result [10] (Figure. 3b) indicates that 86% (85% of Year 2, 87% of Year 3) of the students were inspired for ethical practice, while 14% (15% of Year 2, 13% of Year 3) of the students were not.

Comparing with the lecturers' views, the students exceeded (4%) the lecturers' expectations on self-inspiration for ethical practice. Further analysis into the results indicates a gradual increase in inspiration as these students progress into their year 3. Such increase is believed to be attributed to the students' increasing exposure to engineering ethical issues during their industrial placements and those that have been embedded in the civil engineering program.

Question (4): In your opinion, does study /or investigation of past civil engineering projects lead to a better students' understanding in Civil Engineering?

The results (Figure. 4a) indicate that 73% of the lecturers believe the students would be led to a better self-understanding, while 17% do not think so. Whilst, previous results [6] (Figure. 4b) indicates that 90% (86% of Year 2, 94% of Year 3) of the students believe reviewing the past project

have led to a better self-understanding, while 10% (14% of Year 2, 6% of Year 3) of the students did not think so.

Comparing the lecturers' view, the students exceeded the lecturers' expectation (17%) in self aspiration for better understanding. Further analysis into these results indicates an increase as these students progress into their year 3. Such increase is as expected, as it is attributed to the continual development of students' technical competencies and the ability to recognize the importance of quality understanding.

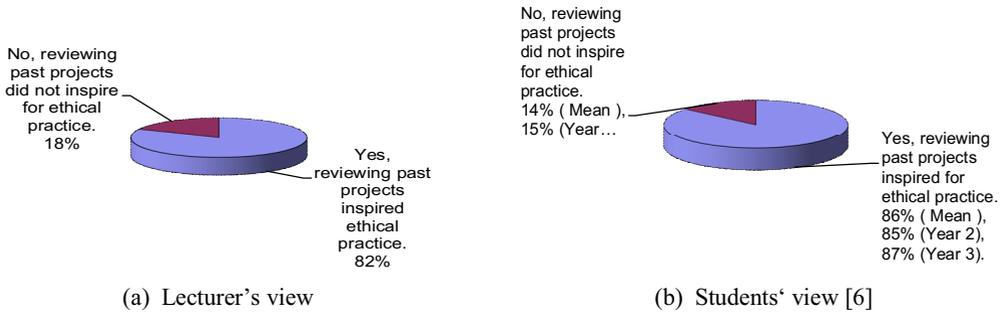


Figure 3. Lecturers' and students' views on students' inspiration for ethical practice in future career.

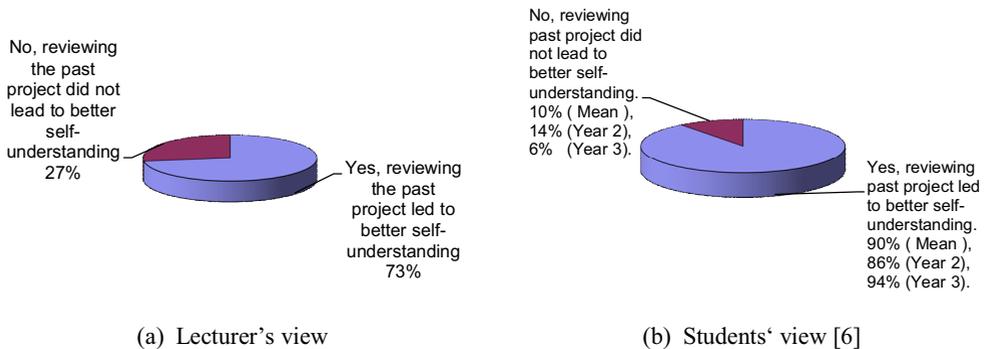


Figure 4. Lecturers' and students' views on students' desire for better understanding.

Question (5): Indicate your preference in which way should the case studies be included in Civil Engineering modules/courses?

The results (Figure. 5a) indicate that 38% of the lecturers preferred to have the case studies as group projects, 32% as part of the taught modules, 27% as individual coursework in the form of report coupled with presentations /or discussions, and the remaining 11% of the students preferred to maintain the case studies in essays form. Whilst, previous results [6] (Figure. 5b) indicate 31% of the students preferred to be as group projects, 27% as part of the taught modules, 23% as individual coursework, and the remaining 19% preferred to maintain in essays form.

Despite some differences noted in the percentage distributions, the overall ranking of preferences are essentially identical between the lecturers and the students. That is, group projects (first preference), part of taught module (second preference), individual report coupled with presentation /or discussion, and lastly, the individual essay. However, further analysis of results indicate an increase in preference for group or discussion based integration with respect to coursework or taught based integration, as students progress into their year 3.

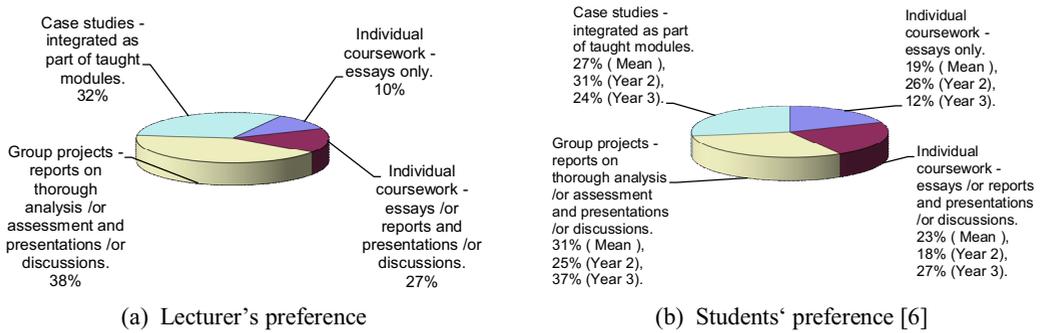


Figure 5. Lecturers' and students' preference on integration of past projects.

Question (6a): Should the past projects be included in further Civil Engineering modules/courses?

The results (Figure. 6a) indicate that 100% of the lecturers preferred to have the case studies to be integrated into further modules. Whilst, previous results [6] (Figure. 6b) indicate that only 83% of the students preferred to have the case studies integrate into further modules, while 17% preferred not to. However, further analysis into these results indicates an increase in students' desire for integration as these students process into their year 3.

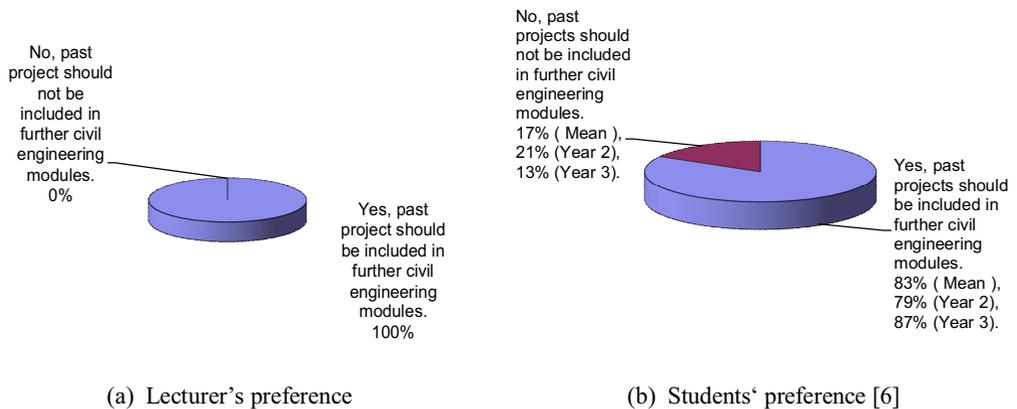


Figure 6: Lecturers' and students' preference on on inclusion of past projects.

Question (6b): If yes, please indicate the preferred courses/disciplines.

The result (Figure. 7a) indicates that 29% of the lecturers preferred to have the past project included in structural modules, 28% in hydraulic modules, 26% in geotechnical modules, 17% in transportation modules, and 0% in management. Whilst, previous results [10] (Figure. 7b) indicates that 42% of the students preferred structures, 28% management, 18% geotechnics, and 8% hydraulic modules, and 4% transportation modules. Comparing the lecturers' view with respect to that of the students indicates major differences in preferences, that is, hydraulic has risen from the forth to the second place, transportation has risen from the last to the forth place, management has dropped from the second to the last place, while, structures & geotechnics remains un-changed.

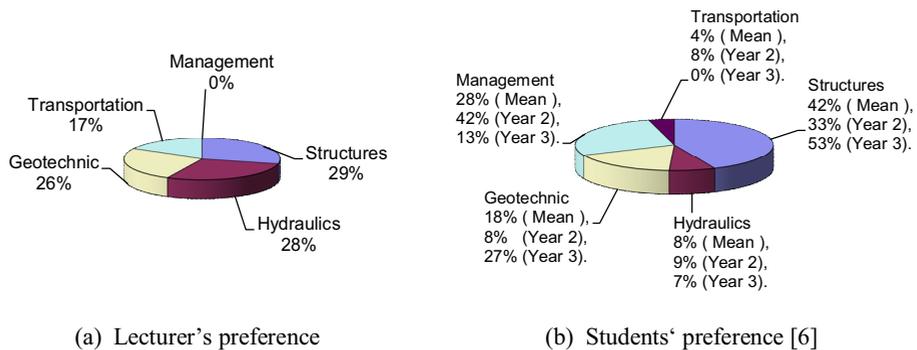


Figure 7. Lecturers' and students' preference among civil engineering disciplines.

4 Conclusions

The outcomes of this study indicate that the lecturers' views agree with the students' views at UNMC. The outcomes indicated that the use of past civil engineering projects enhances the students' educational experiences in higher education in the context of quality cognitive learning, and in their understanding/appreciation of civil engineering practice. Challenges faced by engineers involved influence our students, in a positive manner, and instill the level of moral for future ethical practice. All academics and majority of our students felt that the case studies are necessary and beneficial to their educational experience, and should be integrated into further civil engineering modules. Our students appreciate the importance of quality self-learning during their higher education. The use of past civil engineering projects reassures their aspiration in becoming civil engineers upon graduation.

Acknowledgements

The support of the University of Nottingham Malaysia Campus is acknowledged.

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