STUDENT ATTITUDES TOWARDS PROGRAM PLACEMENT AFTER FIRST YEAR COMMON CORE AT THE SCHULICH SCHOOL OF ENGINEERING

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Abstract – In this paper, we report on a study to quantify students’ attitudes towards the common first year program offered at the Schulich School of Engineering. A survey of students from all four years of each of the School’s seven BSc programs is performed to determine if the common first year program is achieving its objectives from a student perspective. More specifically, the survey focuses on both student opinion and student behaviour with respect to the common first year and program selection. Students are asked to provide their input on benefits of a common first year (i.e., as a foundation for engineering studies and exposure to the range of engineering disciplines) and its role in the program selection process (i.e., if a different process is preferred, and how their program selection choice was impacted by a common first year).

Keywords: First year engineering: professional development: program placement

1. INTRODUCTION

Prospective engineering students in Canada have many decisions to make prior to their first term at university. Not only must they choose from a wide range of engineering schools, but they must also make an important decision about their future engineering discipline (e.g., chemical engineering, mechanical engineering, etc.). This is difficult for new engineering students who have had little, if any, exposure in high school to the traditional engineering disciplines, and likely no exposure to more specialized disciplines such as geomatics and mechatronics engineering.

Of the 31 English language universities in Canada offering CEAB (Canadian Engineering Accreditation Board) accredited engineering programs [2, 3], 55% offer a common first year program to help students with this choice. At these engineering schools, students are not required to apply directly to a specific engineering program; instead, they enter a common program that provides them with exposure to the range of engineering programs offered as well as time to make their decision at the end of first year.

Unfortunately, the benefits of a common first year program can be confounded by practical constraints. Most noticeably, program capacity does not always match student demand and, as a result, students cannot always be placed in their “first choice” program. Typically, program placement decisions are based on program capacity: in cases of excess demand, student performance (e.g., first year grade point average) is used as the basis for program placement decisions.

A second practical constraint relates to course registration. To achieve the full benefit of a common first year, program selection must occur at the end of first year (e.g., in April) and program placement decisions can extend well into the Spring term (e.g., late May to early June). However, registration for senior (second, third, fourth year) courses typically opens in the middle of the second term (e.g., March) at most universities.

Understandably, there is the potential for considerable student frustration with first year common core program placement processes: especially, in cases where students must wait until the Spring term to learn that they were not placed in their first program of choice. Although there appears to be considerable merit with a first year common core system that provides students with exposure to the range of engineering disciplines and the time to make an informed decision, it is understandable that many students would rather risk making a less informed decision about their career path at the end of high school than not receiving their first choice at the end of first year.

The objective of this study is to quantify students’ attitudes towards the common first year program offered at the Schulich School of Engineering. In this paper, we report on a survey of students from all four years of each of the School’s seven BSc programs to determine if the common first year program is achieving its objectives from a student perspective. More specifically, the survey
focuses on both student opinion and student behaviour with respect to the common first year and program selection. Students are asked to provide their input on benefits of a common first year (i.e., as a foundation for engineering studies and exposure to the range of engineering disciplines) and its role in the program selection process (i.e., if a different process is preferred, and how their program selection choice was impacted by a common first year).

We begin with a brief overview of the program selection process used at the Schulich School of Engineering. Next, we describe the methods used for this research in Section 3. The paper concludes with a summary of the survey results in Section 4 and our comments on the study in Section 5.

2. THE SCHULICH SCHOOL OF ENGINEERING’S COMMON CORE PROGRAM

Like other Canadian engineering schools with a common first year program, the Schulich School of Engineering’s common first year program is designed to provide students with the background needed to make an informed choice about their ultimate major program of study. Students enter the Schulich School of Engineering with no declared major program. During their first two terms of study, students are provided with an introduction to each of the School’s seven engineering programs in a first year “design and communication” course (Engineering 200) [1], and are also provided with exposure to the various engineering disciplines in a series of junior engineering science courses (e.g., engineering mechanics, engineering materials, electrical circuits). At the end of first year, students are asked to rank their program preferences, and are placed into programs on the basis of program capacity, grade point average and demand.

Given that all Schulich School of Engineering undergraduate programs have fixed quotas, it is not possible to perfectly match student demand to available seats. As a result, all students cannot be placed in their first choice of program. For example, for the Fall 2013 admission cycle, 65% of the School’s students entering second year received their first choice of program (79% received first or second choice). Student first choice demand vs. program quota varied from approximately 20% to 191% for the least and most popular programs respectively.

Despite this apparent disparity, anecdotally, Schulich School of Engineering students do see value in having a broad foundation in engineering and the time to make an informed decision about their choice of program. However, there is anxiety about the competitive nature of the program placement process and dissatisfaction amongst students who do not receive their “first choice” program.

In the next section we describe the study that was performed to gauge student opinion and student behaviour with respect the common first year and program selection at the Schulich School of Engineering.

3. DESIGN OF THE STUDY

3.1 The Common First Year Survey

As noted previously, anecdotal evidence (discussions with students) suggests that Schulich School of Engineering students see value in the School’s common first year curriculum and making their decision of engineering program at the end of first year. The motivation for this study is to validate this observation through empirical evidence so that we can focus our efforts on strengthening the common first year program and improving the program selection process. Additionally, we are interested in determining if students prefer alternative models of program selection (e.g., making their choice of program earlier, direct entry, etc.).

In order to gauge student opinion on the School’s first year common core and program selection process, an online survey was conducted at the end of the Fall 2013 term (December 2013 – January 2014) using the Survey Monkey tool [4]. This time period was chosen in order to provide first year students with sufficient time to become familiarized with the Schulich School of Engineering and the first year common core program, and to minimize the impact of completing the survey on students’ busy academic schedule.

The survey, provided in Appendix A, was designed to take no more than 20 minutes to complete (4 questions for first year students; 8 questions for second, third, and fourth year students), and consisted of questions of two general types: (1) questions relating to students’ choice of program, and (2) questions relating to students’ attitudes towards first year common core. The Engineering Student Society was chosen as the intermediary to avoid any potential for coercion or undue influence that may have resulted if, for example, the survey was implemented by professors in the classroom or by the School’s administrators. In order to provide incentives to complete the survey, $5 gift cards (from a national coffee shop) were offered to the first 200 participants, and all participants were entered into a draw for three grand prizes (computer tablets valued at approximately $300 each).
3.2 Research Question

In order to gain further insights into student attitudes towards program placement after a common first year, we explored the following research questions:

1. Do Schulich School of engineering students see value in a common first year program?
2. What is the preferred program selection process of Schulich School of Engineering students?

4. RESULTS

The common first year and program placement survey (shown in Appendix A) was opened to all Schulich School of Engineering students on 9 December 2013 and ran until 31 January 2014. During this period, 997 responses (approximately 33% response rate) were received, with roughly equal representation from each of the cohorts (35% of first years, 39% of second years, 31% of third years, 30% of internship students, 30% of fourth years). Of the students surveyed, the majority indicated that the Schulich School of Engineering’s current first year common core model is achieving its purpose of exposing students to the various engineering disciplines and providing them with the time needed to make an informed choice about their future major program. As well, despite not being able to guarantee all students their first choice of program, the majority of the respondents prefer the current model.

As can be seen in Figure 1, when asked the question “What influenced your first choice of program?” (survey question 6), the majority (59%) of students responded with “exposure to the discipline in first year”. The figure provides the survey results for second year (Y2), third year (Y3), internship (INTE), and fourth year (Y4) students: the overall results for all students surveyed for this question (Y2 to Y4) are 59% for “exposure to the discipline in first year”, 10% for “friends”, and 31% for “other”.

The second highest response for each cohort was “other” (31% of overall responses). In these cases, most students responding with “other” indicated that they were influenced by personal interest, job prospects, and family. In many cases, students also indicated that their choice was influenced by academic factors such as the GPA requirement for entry into the more popular disciplines and difficulties in discipline related courses.

In order to gauge students’ opinion of the efficacy of the Schulich School of Engineering’s common first year program, students were asked to indicate their level of agreement with the statement “The Schulich School of Engineering common first year program provides …” (survey question 8). Table 1 shows the percentage of students who agree or strongly agree with the statement (indicated as “% agree”) or who disagree or strongly disagree with the statement (indicated as “% disagree”). The table also shows the 95% confidence interval based on the number of responses in each category: 1 – “strongly disagree”, 2 – “disagree”, 3 – “agree”, 4 – strongly agree”. For example, 95% C.I. [3.08,3.24] indicates that the confidence interval for the population mean at a 95% confidence level falls between 3.08 and 3.24, or slightly higher than “3 – agree”.

Table 1: Y1 student feedback on a common first year.

<table>
<thead>
<tr>
<th>The Schulich School of Engineering common first year program provides:</th>
<th>Response</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td>94% agree</td>
<td>[3.08,3.24]</td>
</tr>
<tr>
<td>exposure to the School’s engineering programs</td>
<td>88% agree</td>
<td>[3.04,3.22]</td>
</tr>
<tr>
<td>time to make an informed decision about an engineering program</td>
<td>82% agree</td>
<td>[2.96,3.16]</td>
</tr>
<tr>
<td>opportunities to meet a wide range of engineering students</td>
<td>76% agree</td>
<td>[2.84,3.04]</td>
</tr>
<tr>
<td>no benefits - I would prefer discipline-specific courses in first year</td>
<td>72% disagree</td>
<td>[1.91,2.15]</td>
</tr>
</tbody>
</table>

The results for Y2 to Y4 cohorts for this same survey question are consistent with the Y1 results as shown in Tables 2-5.
Table 2: Y2 student feedback on a common first year.

<table>
<thead>
<tr>
<th>The Schulich School of Engineering common first year program provides:</th>
<th>Response</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td>88% agree</td>
<td>[3.01,3.17]</td>
</tr>
<tr>
<td>exposure to the School's engineering programs</td>
<td>85% agree</td>
<td>[3.02,3.20]</td>
</tr>
<tr>
<td>time to make an informed decision about an engineering program</td>
<td>78% agree</td>
<td>[2.96,3.16]</td>
</tr>
<tr>
<td>opportunities to meet a wide range of engineering students</td>
<td>85% agree</td>
<td>[2.15,3.33]</td>
</tr>
<tr>
<td>no benefits - I would prefer discipline-specific courses in first year</td>
<td>71% disagree</td>
<td>[1.95,2.19]</td>
</tr>
</tbody>
</table>

Table 3: Y3 student feedback on a common first year.

<table>
<thead>
<tr>
<th>The Schulich School of Engineering common first year program provides:</th>
<th>Response</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td>81% agree</td>
<td>[2.82,3.00]</td>
</tr>
<tr>
<td>exposure to the School's engineering programs</td>
<td>81% agree</td>
<td>[2.83,3.01]</td>
</tr>
<tr>
<td>time to make an informed decision about an engineering program</td>
<td>72% agree</td>
<td>[2.78,3.00]</td>
</tr>
<tr>
<td>opportunities to meet a wide range of engineering students</td>
<td>76% agree</td>
<td>[2.86,3.06]</td>
</tr>
<tr>
<td>no benefits - I would prefer discipline-specific courses in first year</td>
<td>69% disagree</td>
<td>[2.07,2.33]</td>
</tr>
</tbody>
</table>

Table 4: INTE student feedback on a common first year.

<table>
<thead>
<tr>
<th>The Schulich School of Engineering common first year program provides:</th>
<th>Response</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td>84% agree</td>
<td>[2.90,3.18]</td>
</tr>
<tr>
<td>exposure to the School's engineering programs</td>
<td>91% agree</td>
<td>[3.01,3.27]</td>
</tr>
<tr>
<td>time to make an informed decision about an engineering program</td>
<td>88% agree</td>
<td>[2.99,3.31]</td>
</tr>
<tr>
<td>opportunities to meet a wide range of engineering students</td>
<td>91% agree</td>
<td>[3.23,3.53]</td>
</tr>
<tr>
<td>no benefits - I would prefer discipline-specific courses in first year</td>
<td>86% disagree</td>
<td>[1.80,2.14]</td>
</tr>
</tbody>
</table>

Table 5: Y4 student feedback on a common first year.

<table>
<thead>
<tr>
<th>The Schulich School of Engineering common first year program provides:</th>
<th>Response</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td>86% agree</td>
<td>[2.92,3.10]</td>
</tr>
<tr>
<td>exposure to the School's engineering programs</td>
<td>72% agree</td>
<td>[2.74,2.96]</td>
</tr>
<tr>
<td>time to make an informed decision about an engineering program</td>
<td>75% agree</td>
<td>[2.76,2.98]</td>
</tr>
<tr>
<td>opportunities to meet a wide range of engineering students</td>
<td>84% agree</td>
<td>[3.07,3.27]</td>
</tr>
<tr>
<td>no benefits - I would prefer discipline-specific courses in first year</td>
<td>72% disagree</td>
<td>[1.96,2.22]</td>
</tr>
</tbody>
</table>

In order to address our second research question, students were asked “Which program selection process would you prefer?” (survey question 9). As can be seen in Figure 2, the majority of students (71% overall) indicate that the current, “common first year – choice of program at the end of first year” approach is preferred.

Fig. 2. Student responses to “Which program selection process would you prefer?”.

Of the small percentage of students (3% overall) who responded with “other”, their recommendations for an alternative program placement approach followed three main themes: (1) extending the current common first year program to a two year, common first and second year program, (2) moving towards a holistic program placement process that is not entirely based on GPA, and (3) providing students with the choice of direct entry vs. common first year at the time of admission.
5. DISCUSSION

The results of the common first year and program placement survey were quite promising. The majority of the students surveyed agreed that the School’s common first year program is meeting its objectives of providing students with exposure to the various engineering disciplines while providing them with time to make an informed decision (research question 1), and that the current program selection process is preferred (research question 2).

It should be noted that the results reported in this paper should not be generalized to all Canadian engineering schools. For example, the survey reported in this paper did not ask students if they chose the Schulich School of Engineering because it has a common first year program. It is very likely that the students who have already decided on an engineering discipline in high school are likely to select engineering schools with direct entry, while those who are uncertain about their choice of discipline are likely to select engineering schools with common first year programs.

However, the results of this study are very encouraging for our future work at the Schulich School of Engineering. In particular, the knowledge that Schulich School of Engineering students do value a common first year program will allow us to focus our efforts on improving the program selection process (i.e., increasing the percentage of students who receive their first choice) as well as ensuring that the outcomes of our first year engineering courses provide our students with the background needed to make an informed choice about their discipline.

Acknowledgements

The authors wish to thank the Suncor Energy Foundation and the Schulich School of Engineering for their generous support of this research. As well, we would like to thank the Schulich School of Engineering’s Engineering Student Society for their assistance with this research.

References


APPENDIX A: COMMON FIRST YEAR AND PROGRAM PLACEMENT SURVEY

Q1 - Please indicate your current year of study.
- First Year
- Second Year
- Third Year
- Internship
- Fourth Year

Q2 - Do you know what engineering discipline (program) you want to pursue?
- Yes Chemical Engineering
- Yes Civil Engineering
- Yes Electrical Engineering
- Yes Geomatics Engineering
- Yes Mechanical Engineering
- Yes Oil & Gas Engineering
- Yes Software Engineering
- Not yet I will decide at the end of first year

Q3 - Please indicate your program major.
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Geomatics Engineering
- Mechanical Engineering
- Oil & Gas Engineering
- Software Engineering
- No program

Q4 - Did you know what engineering discipline (program) you wanted to pursue prior to first year?
- Yes Chemical Engineering
- Yes Civil Engineering
- Yes Electrical Engineering
- Yes Geomatics Engineering
- Yes Mechanical Engineering
- Yes Oil & Gas Engineering
- Yes Software Engineering
- No
Q5 - Did you choose the same discipline at the end of first year?
- Yes
- No – I chose Chemical Engineering
- No – I chose Civil Engineering
- No – I chose Electrical Engineering
- No – I chose Geomatics Engineering
- No – I chose Mechanical Engineering
- No – I chose Oil & Gas Engineering
- No – I chose Software Engineering

Q6 - What influenced your final choice of program?
- Exposure to the discipline in first year
- Friends
- Other (please specify)

Comment

Q7 - Did you receive your first choice of program?
- Yes
- No

Q8 - Please indicate your level of agreement with the following statements on the common first year program.

The Schulich School of Engineering common first year program provides:

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly disagree</th>
<th>disagree</th>
<th>agree</th>
<th>strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a solid foundation for my engineering studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exposure to the School's engineering programs</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>time to make an informed decision about an engineering program</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no benefits I would prefer discipline specific courses in first year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment

Q9 - Which program selection process would you prefer?
- Common First Year Choice - of program at end of Winter term
- Common First Year Choice - of program at end of Fall term
- Direct Entry Choice - of program at end of High School
- Other (please specify)