AC 2008-2127: THE FIRST YEAR TRANSITION: CHALLENGES AND SOLUTIONS FOR STUDENTS, INSTRUCTORS AND ADMINISTRATORS

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The First Year Transition: Challenges and Solutions for Students, Instructors and Administrators

Research has documented the numerous challenges in transitioning to university life, including adjustments to lectures and large-class settings, residence life and social interactions, self-directed learning and new-found independence. Set in the context of a large university, with a high percentage of commuting students and a very diverse student population, this paper examines teaching and learning challenges in a first year engineering program.

Through the collection of qualitative and quantitative data with a first year engineering class in 2006, challenges with the transition from high school to university, and potential strategies for improving this transition are identified. This is followed with a report on strategies implemented in 2007, and an initial assessment of their effectiveness. Outcomes of this research seek to promote discussion around the challenges of the first year, in particular within engineering, and the need for program and university-wide response to these challenges, including the implementation of pre-college and transition programs and student services designed specifically for the first year.

The transition of students from high school to university is a key issue in the engineering education research. Engineering programs provide a unique setting: students typically have more class hours, and often more assigned work beyond class, than students in other undergraduate programs. There is often a serious and problem-inducing disconnect between high school and first year curricula in engineering programs. Finally, students immediately find themselves in a professional program, where they are expected to exhibit a certain level of maturity and work ethic, while at the same time take on the social identity of a first year university student.

Strategies such as the ones discussed in this paper (online and onsite orientation, and facilitated study groups), and the need for these strategies has been promoted through research on the first year experience. Braxton and McLendon[1] note that social integration and subsequent institutional commitment are empirically reliable sources of influence on college student departure, and they specifically note that advising, communication with students, the development of social environments, techniques of collaborative learning & active learning, and student orientation programs all have an impact on student retention. These methods are key components of the projects discussed in this paper. Several projects for improving the first year transition have been initiated and documented in engineering schools around the world, including learning communities, subject-based preparation and bridging programs, mentorship programming and e-mentoring, however, facilitated study groups and online orientation programs in engineering schools have not been widely reported or researched.

Examining the First Year Experience

In 2006, research was conducted to determine and describe the challenges, for both students and instructors, in the transition to a first year engineering program. Research methodology used in

this study primarily falls within the naturalistic paradigm, enabling themes and conclusions to emerge from the situations under study. Multiple data collection methods were used to triangulate data: an extensive student survey with numerous questions to address the multiple dimensions of the first year experience, student interviews with individuals representing diverse achievement levels and cultural, personal, and academic backgrounds, and instructor interviews.

The survey was completed 3 weeks prior to the completion of classes in the second semester of the first year. 116 students (out of a possible 250) completed the survey. The survey asked students to rate the level of challenge in the program and in adjusting to university life, to identify the factors in creating challenge, and to discuss aspects of their student experience as first year students. Five in-depth student interviews were also conducted, to learn more about some of the relevant themes in the first year experience. The interviews allowed for a great degree of latitude in discussion topics, so that if there was a particular issue of importance to the student, more time would be spent on discussing that issue. The formal questions for the interviews included:

- What do you find were the greatest challenges in transitioning from high school to university?
- What has had the most significant impact on your university learning?
- Do you feel that your non-academic life impacts your academic life more so than in high school?
- How do you feel about the quality of instruction in the program?
- Do you feel comfortable with your instructors? Do you feel comfortable interacting with them in small groups, or in a one-on-one situation?
- Where do you learn the most? In class? In laboratory? When working individually? When working on your own? In tutorials?
- What do you find particularly challenging about learning from a lecture?
- Do you find that learning is more independently-driven than when you were in high school?
- How do you feel about assessment in university?
- Is there anything else you'd like to add about the challenges in transitioning from high school to university?

After completion of the survey, data was tabulated, and qualitative question results were grouped into various themes that emerged in the data. The survey results indicated that 44% felt that they had been "well-prepared for university academics", while 56% did not. Students described the following as common factors in the challenge behind the shift from learning in a high school setting to an engineering program, each of which represent comments provided by several students from the pool of 116 who completed the survey:

- Workload and Pace
    "The quantity of information is overwhelmingly large"

- Independent Learning & Time Management
    "I found managing my time and organizing myself the hardest!"

- Lack of Individual Attention & Care
  - *"No more private, intensive, personal counselling as in high school. Instead, university is an impersonal, independent experience."*

- Peer Influence & Competition
  - *"The level of competition in high school being in the top 5% was very easy, here keeping up is hard."*

- Level of Difficulty
  - *"The difficulty of course material in university is a lot higher than that in high school, there is a huge gap in between, and we never get time to catch up."*

- Teaching Style
  - *"Getting use to lecture-style teaching"*

- Lack of Social Life
  - *"Less social time – no time to go to the gym or participate in clubs"*

- Effectiveness of Learning
  - *"There is a lot less time to learn, and because of this I feel that we are not reaching our full potential. It seems like we are now just aiming for the minimum (because) we are so pressed for time."*

- Scheduling and Class Hours
  - *"The completely random class schedules. Adjusting to the increase in classes and lectures is difficult."*

- Evaluation
  - *"Change in difficulty of evaluation, bell curves and not knowing your mark until grades come out."*

Other factors cited by the students included diverse academic backgrounds, issues with commuting, class sizes, specific issues for ESL students and dealing with the pressure to do well. When asked about how they could have been better prepared for their engineering program, the most common suggestions from the first year students can be described as follows:

- Specific subject material
  - *"More calculus, thermo, algebra and geometry in high school"*

- Greater Workload in High School
  - *"Learned more in High School", "Faster Pace in High School"*

- Study Ahead Programming
  - *"Summer program preview, that covers trig, computer science, etc."*

- Preview of Courses
    "I would have liked more detail about the program content (e.g. course material) prior to starting"

- Nothing
    "No preparation would have helped, only the experience teaches you"

- Gone through a private school, AP or IB
    "Gone to an elite private school, i.e. Upper Canada College"

Other suggestions from the students included learning skills in time management, independent learning, and specific preparation for the new style in teaching at the university.

Students were asked about the most challenging components of learning in their program. Their choices, in order of most to least frequently selected, were:
1) Nature of assessment type
2) Changes in non-academic life
3) Independent learning
4) Course instruction
5) Laboratories
6) Teaching assistants
7) Class size (i.e. large class sizes)
8) Interactions with instructors
9) Working in groups

The interviews provided meaningful comments on the greatest challenges in the transition and the first year experience. All interviews were transcribed, and the transcripts carefully reviewed and coded. Three main themes emerged from the examination of the interview transcripts:

Social Life
Students defined how elements of the social atmosphere impacted their experience as a first year student:
    "Before, you could introduce yourself…Like, I'd want to know other people and they'd want to know me, but now, it's more like I know the people I know, and I don't feel that other people want to know me very much"

    "I joined a lot of clubs, but I realized I had to cut some out so I could focus more on my work – I had to remind myself that I'm here to learn"

    "Getting use to the anonymity is tough. Coming out of high school, it was a pretty tight knit community. People seemed to know who I was"

Craving Structure
The students discussed their appreciation for structure, and where it exists, in the first year experience:

"I like how (one class) has their weekly review sheets. So, those are kind of like, well, you fell asleep in lecture during the week, here is what you had covered, and then you can ask – oh ya, I remember that thing, but I don't really understand that part."

"I like how (one class) is run – the assignment is given to us at the beginning of tutorial, and it's due at the end – there's no stress in that. You don't have to take things home."

"I get the impression that instructors feel that it's our responsibility to know the details about assessment – they don't remind us, or post information in easily located places. They'll post tests, but they won't put all the information with the same announcement."

Assessment
The students described challenges experienced in adjusting to assessment in the university setting:

"In high school, I never had to calculate, how much is this worth? or how much time I should put into it. I did the best I could on everything."

"I use to be able to make everything perfect, but now I have to be selective on what I do well. It bothers me that I'm handing in things that I could do better on if I had more time. It's unrealistic to make everything perfect"

Interviews were also conducted with 3, first-year instructors. Through these interviews, the instructors discussed the challenges in teaching and learning with respect to first year students. Again, the interviews were left open to explore issues of meaning to each particular instructor, however, the interview was structured around a set of questions:

- What do you feel are the biggest challenges to first year students' learning?
- As an instructor, how do you respond to these challenges?
- What are some of the particular challenges that you face as an instructor, in teaching first year students?
- Do you feel any general changes should be made to better suit the learning needs of first year students?
- Do you feel students are well prepared? Should we take a stronger role in academic orientation?
- Do you have anything else you'd like to add about teaching and learning in the first year?

The interview data revealed several relevant themes of concern to the instructors:

Diverse Backgrounds
Instructors described the challenges surrounding working with students from different academic backgrounds and experiences:

"Eternally, they come in with all different skill levels, and study techniques, and they all get put into the same cookie-cutter first year course"

"Catering to IB, AP, Private Schools, Out-of Province – they're all different"

Life Skills
Instructors were concerned not only with academic preparation, but also the coping and life skills necessary to succeed in university:

> "They're so young. They have such poor coping skills. They haven't had enough time to really socialize, develop their own identity, and their sense of the world"

> "They're younger, they seem to be a little more confused and ill at ease. Every so often, I'll catch myself asking them "have you eaten today" Part of my place is helping them develop skills to learn."

Tension in Providing Structure
The instructors interviewed described a tension between providing structure, and fostering independent learning among the students:

> "In this program, it's so big, you can't possibly keep tabs on them all. We can't babysit them. It's a little cruel, and harsh to say it, but maybe it's good that they learn early not to treat this like high school."

> "(Certain types of medium) – they don't respond well to at all. So I'm pandering to them a bit, in terms of determining my delivery methods."

> "They've been raised as flashcard, highly structured kids, where they aren't use to freedom, deciding what to do next"

Student self-realization
Instructors described their concern in that students may not recognize if or when they need assistance, especially in a busy first-year engineering program:

> "I think a lot of these (students) don't realize the help they need. Because they're so smart, they never needed to learn in high school – it just came naturally."

> "They've never had to learn how to be good at what they do from the learning side of things. They've been able, by sheer ability, to attain really high marks."

> "They seem to be able to think at a deep level, but they're not given the opportunity to do so. There isn't a lot of space in the program left for reflecting"

Student Expectations
Instructors expressed surprise, and frustration, with the students' expectations of their instructors:

> "People will email in ways that will make it seem like I'm serving at McDonald's rather than serving as a professor. I'll get a message like "this assignment is marked incorrectly. Correct it at once!"."

> "They want solutions to things, practice exams, bulletin board, email response, TA's in the lab – if they've ever gotten it in the past, than they want it in your course."

"consumer mentality of education also plays a part. They have expectations that I don't yet know the genesis of."

Finally, the instructors provided several suggestions for consideration in managing the first year transition, including the implementation of a preparation program, providing a better preview to first year, encouraging student reflection on how and what they learn, fostering collaboration with secondary schools and the promotion of a balanced student experience. Many of these suggestions actually echoed those of the first year students.

Through the student survey, and student & instructor interviews, several issues and ideas were discussed, relevant to a successful first year transition. It became apparent that considerations needed to be made both in terms of academic and social preparation, and a balance needed to be maintained in providing helpful services and structure to students, while still fostering independent thinking and learning skills. With the data in mind from the first phase, several strategies were implemented in 2007.

Implementing First Year Initiatives

In 2007, three new initiatives were implemented to create a smoother transition, and more successful first year experience. The initiatives were a 5-week, online orientation program prior to the beginning of the first year, facilitated study groups to run throughout the first year, and on-site program orientation sessions, facilitated by both program stuff and students and run during the traditional orientation week. These initiatives covered both the learning strategies model and academic socialization model, as described by Ryan and Glenn[2]. Using an approach that covers both models, it is acknowledged that students need to develop skills to thrive academically, but also that students need more than study skills – they need to be integrated into the culture of the university. The notion that social integration is an essential factor in student retention, and that a lack there of is a key component in the decision of many students to leave university[3] influenced the nature of the initiatives designed.

The online orientation program allowed students to explore topics such as academics, school life, and living well through articles, tips and video developed by upper-year students and program staff. The limited research that has been conducted on online orientation programs indicates that they can play an important role in the transition, even through preparing students for what's ahead in onsite orientation and the first few weeks of university[1]. Research on orientation programs has indicated that successful programs need to help students understand what their experience will be like, and the importance of integrating those who have had the experience before[4]. Students entering first year were lead through a 5-week program, that introduced new content each week and included a strong presence from upper-year engineering students. Specific site features included:
- A bulletin board, for posting questions to other incoming students and an upper-year student moderator
- A chat function, for real-time chat capabilities with an upper-year student
- Information about the program, to provide students with history, basic program information and milestones/events to come

- Academic preparatory lessons
- Articles on healthy living & extracurricular involvement in engineering
- A staff and student blog, used as a method of introducing key program staff members and students to the first year class
- Transition tips and busted myths about the program
- Student profiles and podcasts, designed to introduce incoming students to upper-year students

The facilitated study groups, also known as a supplemental instruction program, were designed to provide subject-specific support and enrichment to students in the program throughout the first year, particularly in subjects that students typically find challenging. Supplemental instruction is a method that was developed at the University of Missouri-Kansas City in the mid-1970's by Deanna Martin[5]. Originally, it was designed for a medical school program, and was successful in improving course grades and retention. However, today, it is used across several university programs, although it has not been widely researched within the engineering community. Facilitated study groups are designed to enhance students' understanding of course material, and provide them with skill development for succeeding in particular university courses.[6] Research has demonstrated that a subject-specific approach is needed to support learning how to learn, which is identified as a key issue in first year university success. Students must be competent in constructing knowledge in a discipline, and an interactive and student-centered method is the most effective approach[7]. This need is met through the nature of the facilitated study group method.

Facilitated study groups are led by upper-year students, who have achieved success in the course for which they are running a study group, with the support of course instructors and a study group coordinator. The aim of the study group is to provide students with a forum for working on problem-solving in a collaborative manner; the upper-year student facilitator does not stand in front of the group, solving problems, rather they promote the review of challenging concepts through encouraging students to try problem-solving in groups and identify skills involved in achieving success in a particular first year course. Facilitated study group leaders are provided with pedagogical training and are hired with teaching or tutoring experience. The facilitated study groups are designed to run in a small-group format, and typically attract 5-20 students per session.

The third initiative was a short on-site orientation session, in which students attended with peers from their own tutorial section (and therefore the group with which they would have all classes throughout the semester). The sessions provided a forum for interaction with their peers and upper-year students, and covered time management, a course preview and an introduction to program staff and important administrative issues and procedures. The sessions were held within the first 2 days of class, and so students had an opportunity to ask questions and clear up confusion on course and administrative issues before their academic schedule became hectic.

Evaluating First Year Initiatives

While further evaluation will take place at the end of the 2007/2008 school year, an initial assessment of the new first-year activities has taken place, through the facilitation of a survey

with the first year class during the first semester. This survey included a sample of 101 students (out of a possible 270) in the program.

Facilitated Study Groups
44 students stated that they participated in the study groups, of which 35 stated that they found the study groups very useful. Students stated that the groups were useful due to their small size, structured format, active learning component and because they were led by knowledgeable upper-year students, who had experience with the particular course in question:

> *"The facilitated study groups were particularly useful because their supervisors often provided practical sample problems for the participants. These problems helped me to review and further understand what was covered in the lectures."*

> *"It was more easy to ask questions then during lectures, and tutorials because it was a smaller group of people who are having the same problems that you are."*

> *"I find it very useful. I participate in the calculus and computer science study group for the last semester, because those two courses cover lots of materials in a very fast pace. It is very difficult to study all the material all at once. Participating in the study groups gives me a focus of study, and by doing problems, it clarifies a lot of points."*

> *"The environment was more welcoming towards students asking questions that would have remain silent in lectures. The interaction between another (upper year student) and us allowed a more informal procedure to understanding material. The smaller sizes encouraged us to ask more questions and discuss the course material until we fully understood."*

> *"Past students were able to provide helpful learning techniques, strategies for learning; learning with peers allowed one to work out complex concepts together, talk about them and share difficulties together to understand them."*

However, some students found problems with the method, which will need to be considered for future planning and implementation. Some students cited that unprepared classmates impacted the quality of the study group:

> *"(the study groups) are mainly geared towards students having trouble with basic material; I mainly had questions about some of the more challenging/confusing material and found it more useful to go elsewhere for help."*

When students were asked why they decided not to attend, the students cited the following reasons:
- Difficult for commuting students to attend sessions outside of class
- Students who were able to form their own study groups didn't need them
- Some students felt that they study better on their own
- With a large number of existing class hours, students felt that they did not want to spend more time in a classroom environment

- Some students didn't feel the method would help them.

The results of the survey questions around the facilitated study groups indicate that the method is useful, but strides should be made to ensure the service is accessible and relevant to all students. Running study groups by level of material may be possible, and considering off-campus or alternatively timed sessions for commuting students would be helpful. It is also important to consider the promotion of the facilitated study groups, and a deeper exploration of why some students feel that the method would not be helpful.

Online Orientation
61 students who completed the survey cited that they participated in the online orientation program over the summer, and all but 5 students stated that they found the online orientation program useful in facilitating their transition to university. Students who commented on the usefulness of the program stated that the information, familiarization with the program and location, reduction of anxiety and introduction to upper-year students made the program a worthwhile success:

"I found that newly coming into the program I had no idea what to expect and likewise the program did not seem to have a human face to it. However, through the orientation and its supportive nature I was able to learn more about the faculty, current student experiences and likewise methods to thrive and succeed in the program. Additionally, the posting of review materials was a great way to allow certain students to review and others to ensure they entered the program with a sufficient prerequisite knowledge."

"I found it helpful because I have me a rough idea of what to expect in the program and how to succeed in the program as a whole."

"It gave me a bit of an idea of what to expect in the program and living in the city.. Having the perspective of students was very helpful, since they tend to know the most about transition to the program."

"There was a ton of information that gave a down to earth preview of what was to come and comic relief. It was very informative."

"It helped me to familiar with university before I had departed for Canada. It's really a nice program for international students."

"Relieved several anxieties, answered questions I had about entering university (residence, program, courses, peers, etc.). Gave a sense of connection to the university by introducing other students,, acknowledging it is a tough program but giving strategies to succeed! As well, great job using forum to introduce profs and division staff!"

However, students also expressed problems with the online orientation approach:

"It was helpful to some extend, but it contained too much information it was very overwhelming."

"An online orientation will never truly prepare you for any university experience."

When asked about possible improvements to the online orientation program for next year, students asked for even more exposure to upper-year students, a better ability to connect with classmates before entering the program, more information about the first year courses and more academic preparatory information, and to provide information in a more compact fashion.

Onsite Orientation
Finally, students were asked about the effectiveness of the onsite orientation program. Students were very positive about their experience in the onsite orientation program:

The onsite orientation helped because it was informative, and it clarified a lot of things that could seem confusing at first, such as quarter courses that were indicated as schedule conflicts on the time-table and bi-weekly laboratory sessions.

Yes I found it helpful. It helped me because it gave me an overview of what the semester would be like, what the grades required would be and the upper year students gave us an insight on what the first year might be like, what to expect and what not. When you enter the first semester of the program,, you realize just how hard it is, but it really helped when I knew that the upper years had gone through the same thing and they made it through. That motivated me to go on.

It was a very good way to meet students in the same division. It could also help us to make many potential friends in the future.

I was able to get all the answers I needed regarding course specifics, typical schedules, possible options, and many other important and/or interesting facts while also meeting the faculty and students. This was the key in my final decision to join the program.

Conclusions & Further Research

The evaluation conducted thus far on the first year transition initiatives indicate that the participants see the relevance and benefits to these services, and that they are making a positive impact on their first year experience. The students have provided data to support the continuation of these activities, and also critical feedback on the initiatives to be considered for the next school year. Only an initial evaluation has been presented; further evaluation will be conducted to determine the effectiveness of the approaches. Specifically, student success and perception of the value of these initiatives will be measured at the end of the school year. Assessing the instructors' perception of these initiatives, in particular the facilitated study group initiative, would also be helpful. An initial assessment indicates that retention has been improved over the last school year although this will also need to be reviewed at the completion of the winter semester.

In considering future initiatives, we must reflect on the fact that the process of transition spans the entire first year[8], and there are various phases to consider in the first year transition. While the facilitated study groups provide support to students throughout the entire year, we must also

consider other initiatives to ensure student success. Strides have been made in understanding and improving the first year transition, and these strides will continue as we learn more about the impact of our initiatives.

"All three programs have helped me through the first year transition - online orientation relieved a lot of my anxieties coming to Toronto, and gave me a few laughs and helpful tips. Onsite let me see what the program was really about, the hours required, and allowed me to meet the division staff and first see who my tutorial group was. Finally, FSGs were very helpful in studying for the first semester and allowed me to catch up to many of my peers in terms of what I had missed in high school."

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