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The Power of the Pre-Course Survey for Course Launch, Addressing Concerns, and Developing Community

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Randy Hugh Brooks, Texas A&M University

Howdy,

After 23 years in Telecom building LD, internet, and email platforms and networks, I observed that the front line personnel that I was hiring didn't have what I considered to be skills that they should be bringing to the table. I began investigating why, and that led me to high school.

Alas, I began my journey in Education in 2010 inhabiting the classrooms of Lovejoy High School, where my two daughters attended.

I redubbed my PreCalculus course as Problem-Solving with Brooks and was also afforded the opportunity to lead an impactul Project Lead the Way (PLTW) Principles of Engineering (PoE) course, a project-based learning survey of the engineering discipline.

Since the Summer of 2015 I have been privileged to work with the Texas A and M Sketch Recognition Lab (TAMU SRL) to evaluate a couple of online tutorial tools (Intelligent Tutoring Systems (ITS)) currently under development, Mechanix and Sketchtivity, that provide immediate constructive feedback to the students and student-level metrics to the instructors. I presented on this work at the state and national PLTW Conventions and at CPTTE in 2016.

I also spent 5 semesters beginning the Fall of 2015 taking online courses learning how to construct and deliver online courses. This resulted in a MSEd from Purdue University in Learning Design and Technology (LDT).

This widely varied background prepared me well for my next big adventure. Beginning in August 2018 I became the Texas A and M Professor of Practice for the Texas A and M Engineering Academy at Blinn College in Brenham. Texas A and M Engineering Academies are an innovative approach to providing the planet with more Aggie Engineers.

I am focused on enhancing the high school through first-year college experience and am an engaged member of the Texas A and M IEEI (Institute for Engineering Education and Innovation).

My foundations were set by an upbringing on the family ranch near Joshua, Texas and 4 memorable years at Texas A and M where I met my wife, I led Bugle Rank #7 in the Fightin' Texas Aggie Band (Class of '86 Whoop!), and dove into Telecom Engineering. Once in Telecom, my learning continued at MCI, Vartec, and Charter.

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Abstract

Often students and faculty experience anxiety with the uncertainty of a new course and new group of students. Each come with their own set of expectations. Pre-course or first-day surveys are powerful tools for identifying student backgrounds and course readiness, helping faculty address concerns, customize course content, and even form teams for later use in the course. We present observations from administering these surveys in several different engineering courses, from first-year engineering to upper-level courses to even capstone courses.

Introduction

Before the first day of class, both students and faculty experience uncertainty and anxiety about the journey that lays ahead. Faculty have certain expectations about what students know coming into the course, the students' academic and life experiences, and even the students' study habits. Students likewise have expectations about what support the faculty will provide, concerns about the challenges in the course based on their own previous experiences or intel from other students, and the students' ability to manage their course/life load.

A simple pre-course or first-day survey is a powerful tool to expose student backgrounds, training, and concerns to the faculty. Faculty in turn can swiftly and accordingly tailor the beginning weeks of the course and supplementary material, identify social and emotional states, reduce student anxiety, and begin to develop a rapport with their students as they support an inclusive classroom community.

In this paper we share best practices for facilitating pre-course and first-day surveys which can be applied to any discipline and at all academic levels. We discuss specific ways to leverage the information gathered in these surveys for course launch, providing one-on-one care even in large classes, and fostering community.

We present observations from deploying these surveys in several different courses including a first-year engineering course, a junior-level project-based computer science and engineering course, and a senior capstone design course. Impact demonstration will be in the form of specific applications where the authors used survey results to best design teams, build connections within and across the student community, and to determine the level of scaffolding needed to address survey-identified student knowledge and skill set challenges.

Approach

A pre-course or first-day survey is a series of questions created by the instructor for the students to answer that help the instructor get to know the students and their backgrounds. It also provides a way for students to express any concerns they bring to the course. These surveys should be short and approachable. The goal is not to grill them on detailed knowledge from prerequisite courses but to get a general sense of their background, interests, and concerns.

Instructors should ponder both their own and student perspectives during question development. For example, a common question is to ask if the student has any concerns or issues that the faculty should be aware of. Themes often emerge that the faculty can address to the entire class, supporting even those students who did not directly vocalize the concern. This shows to the entire class that the instructor is on their team and wants them to be successful in the course. In addition, faculty can send a personalized email to students with concerns and talk about specific ways to alleviate them. As multiple students often have the same concern, it helps save the response for future reuse. Student response to this approach is overwhelmingly positive, especially in large classes where students typically feel unseen and unheard. This sets a tone of caring as, historically, faculty do not often ask their students about their general concerns or issues.

Another way to use these surveys is to identify gaps in student knowledge that need to be addressed. They can expose the background and preparation of students in a course [Wirth and Perkins(2005), Wilson(2018)]. The faculty can then add targeted supplemental activities and make adjustments to other supports addressing the specific needs of the students in a given semester. As college courses move very quickly with high levels of content, there is benefit in creating questions in a pre-course survery that encourage the students to recall prior knowledge, or gain new knowledge, in preparation for the lessons. Faculty may also include leading questions to spur student development and target thinking.

Finally, faculty can create student working groups that more evenly distribute background

knowledge and skill sets [Wirth and Perkins(2005)]. This fosters a collaborative environment where students are encouraged to lean on each other as they build their knowledge and skills. If the survey collects data about student interests, extracurricular activities, or hobbies, instructors can create groups where members already have something in common. This can jump-start team bonding, especially if students are prompted to learn about each other and identify commonalities. For instance, in a junior-level project-based computer science and engineering class focused on teamwork, the instructor had the teams participate in an ice breaker to get to know each other. Afterwards, the instructor asked if any teams found that they had something in common. One team shouted out that they all were in high school band, another said they all participated in high school sports, and another mentioned that they all liked video games. The instructor hinted that it may not be coincidence and then other teams started trying to figure out their common thread. Having them discover this together (and even find things the instructor didn't know about from the survey) brought significant unity in the teams.

In Practice

Pre-course surveys can be applied to courses at a variety of levels. In the following, we provide examples for different types of courses: first-year engineering courses, upper-level engineering courses, and capstone courses. Surveys may be either given before the first day of class or can be administered during the first class day. The benefit of conducting them before the first day of class is that instructors can talk about on the first day how they will tailor the class based on the needs of the particular students in it [Yale Poorvu Center for Teaching and Learning(2021)]. However, there is typically a lower response rate than when class time is given to complete surveys. The benefit of administering the survey during the first class session is that instructors also have the ability to put the survey into context, to motivate its use in the course.

Application to first-year engineering courses focused on teamwork

A key challenge in a first-year engineering course focused on team operation is to effectively and quickly identify student knowledge levels to facilitate team development. A pre-course survey provides a non-threatening environment for gathering this information. By posing the questions from various perspectives, an instructor can assemble an accurate view of, for instance, how much exposure and training the students have had to the field of computer programming. Post analysis of the responses, the instructor can then arrange teams in multiple ways...wide-ranging experience levels, common experience levels, or myriad mixes in between. All done and shared with the students before the first day of class.

Sample questions for a first-year first semester engineering course:

1. What is your last name?
2. What is your first name?
3. What (City/State/Country) do you call home?

4. Do you have a particular engineering industry that you are already focused on? No big deal if not as we will explore career options during the semester. Just let me know.

5. When you begin your career (post-college), do you have a particular location around the planet where you would like to be working?

6. How well-versed are you in all things about this university? Grew up in a university family, or new to all the traditions and lore? Just trying to understand the audience here.

7. What are some concerns and fears that you have about the semester ahead?

8. What are some passions that you are bringing to your engineering career?

9. What level of experience have you had with computer programming? Anything with Python specific? If not, that is expected. We start from the beginning. This just helps me with team design.

Notice the wide array of topics to put students at ease while also gathering some potentially serious and always impactful information. Lead with easy questions, then some reflective questions (career), and then move to the serious (concerns/fears/passions), then finish with a competency reflection. Open-ended questions often provide valuable information about student identity and gives them ownership of what and how much to share [Yale Poorvu Center for Teaching and Learning(2021)].

It helps to also provide some commentary about the purpose of the question, especially if they can be perceived as sensitive in nature. This can alleviate any anxiety the student may feel about why the instructor is asking the question. The student may have some negative past experiences with instructors or authority figures, so this can help dispel any bias or concerns about the instructor.

Application to upper-level engineering courses with a teamwork component

Even upper-level courses benefit from pre-course surveys. While students may have had more experience working in groups and teams, surveys can help assess their prior experience and even with team assignment.

Sample questions from an upper-level engineering course:

1. What is your last name?

2. What is your first name?

3. What name do you prefer to go by?

4. Where did you grow up or go to high school?

5. What extra-curricular activities have you been apart of?

6. What is a fun fact, talent, or particularly interesting thing about you? (What will help me get to know you from the other students?)

7. Do you have the technology you need to participate in this course? (laptop)
8. Were you able to access the Learning Management System, see announcements, and receive notifications?
9. What are you most excited about for this class?
10. Do you have any concerns about taking this course this semester? Is there something I should know about or a way I can help you?

Additional questions helpful in a capstone course where students will to build and evaluate a major engineering design project and need project management and technical writing skills:

1. What are your plans after you complete this course?
2. Have you ever participated in research? If so, explain.
3. Have you ever participated in the write up of a publication or poster? If yes, explain.
4. Have you ever completed an internship or co-op related to your major? If yes, please describe.
5. Have you ever run or designed a user study before?

Notice that the first question provides a mentoring opportunity in helping identify graduating students that still need help navigating what to do after their degree.

Discussion

Student responses to the use of pre-course surveys has been very positive. This is particularly true when instructors address repeated concerns in the class and also personally email students that express concerns in the survey. For example, of the students emailed personally in a junior-level project-based computer science and engineering course, 22.5% responded back to the instructor. All responses were positive in nature, although some were simply a short thank you. Students consistently expressed gratitude:

> *"Thank you for reading the survey, most professors don't in my experience"*
>
> *"Thank you so much for your message! It means a lot to have a professor reach out about the course and reassure their students."*

Some also talked about improved confidence:

> *"Thank you so much for the message, I feel a lot more confident about the course now and I feel like I can succeed in the class thanks to your help. I am really excited to get started."*

Students repeatedly express surprise that their instructor has read and responded to them. They generally feel that often surveys are given but then never looked at.

In some cases, response to surveys can start a dialog between a student and the instructor about specific concerns such as working in groups or impostor syndrome. For instance, one student noted being anxious to work in groups because they felt everyone is always smarter or more prepared than they are. The instructor reassured the student and told them that they could relate and that this is often called impostor syndrome. The student was intrigued and did their own research on it:

> *"Firstly, I should say that I really appreciate the fact that you went over the surveys and got back to me. Thank you.*
>
> *I did not know about imposter syndrome. I looked it up and found interesting information on it. Thanks for sharing that. I think for me, it is hand in hand with my nervousness in communicating with others. My native language is not English. ... In almost all my conversations with others I can feel the lack of a same lingual and cultural background. Along with the feeling that others are more knowledgeable than me, this feeling about language really impacts myself confidence and that always worsens the situation."*

After opening up about their background further, the student was ultimately hopeful about their future success:

> *"All that being said, I am so happy to be in this class as I think all the teamwork in this class can help me overcome or further tend to my issue in working with others as a team. ... Thank you so much for your attention and support."*

Initiating dialogues like this is especially helpful for students who are underrepresented in their class and don't always feel at home in the discipline.

Lessons Learned and Best Practices

There are many ways to implement a pre-course or first-day survey. Here are some lessons learned and best practices from our experience with them.

- Surveys should only have a short set of curated questions, typically 10 or less. It should only take about 5 minutes for a student to complete. Upper-level students can handle more questions (e.g., the capstone example), but they should still be something the student can complete in a short amount of time.

- Free response questions yield richer information than multiple choice questions. They also help students feel more valued and seen in the classroom. This boosts confidence, supports motivation, and paves the way for the student to reach out to the instructor later in the course if they need help.

- Surveys should always include an open-ended question for students to express concerns or anything else they want the instructor to know. This question should not require a response.

- Instructors will get a higher response rate if they motivate the purpose of the survey and model sharing information about themselves to their students. Response rates increase if the instructor provides time in class for the students to complete the survey.

- Responses to student concerns should be addressed quickly, within the first week of the course if possible. Otherwise they lose their impact.

Conclusion

The pre-course survey is becoming a staple item for initiating an inclusive course. A thoughtfully and deliberately designed array of questions draws direct and candid student responses thereby providing the instructor with a view of the class that highlights many different avenues for approaching concepts and team designs. "The knowledge survey is an indispensable tool for enhancing learning. The process of developing a knowledge survey facilitates the clarification and organization of course objectives" [Wirth and Perkins(2005)] and drives reflection on opportunities to enhance your inclusive classroom.

The tone of class can often be predicted by a perusal of the survey responses such that the instructor may confidently launch on a particular path knowing how students will respond based on the class picture painted through the pre-course survey. In addition, having the survey information "on the table" can alleviate some of that first day angst for both the instructor and the students. Addressing student fears or concerns before entering the classroom that first day is a benefit to all and easily facilitated through a pre-course survey and subsequent instructor follow-up to those fears and concerns.

References

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