

S10 36-303 Sampling, Survey and Society

Project #1:

The attributes of innovation in order to meet the challenges of global knowledge economy.

Project group E

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a. What question do you propose to study?

Background

Innovation is a subject of much significance. Since the 30's, Joseph Schumpeter developed studies on how capitalism is affected by market innovations. He established that innovation is a creative destruction (1). At the end of the 20th century, the world experienced more intensely the effects of innovation. The creation of new products, processes, and procedure was constant. Each one of us could feel the effects of innovation, as companies continually create new products to compete in the global marketplace. For example the cellular phone industry is constantly creating new products; launching a new model before we learn to use what we bought.

Just as happened in the last decade of the 20th century, in the 21st century, nations, states, businesses, and individuals must meet the challenges of the global knowledge economy to create value. The ability to innovate in each of these levels depends on the capacity for innovation (2). Since 2002, Canada has been implementing a national strategy of innovation that established the innovation as an engine for the development of the country. The Prime Minister Jean Chrétien said "prosperity depends on innovation, which, in turn, depends on the investment that we make in the creativity and talents of our people"(3) (4) (15).

Innovation is becoming an increasingly relevant and important feature of human capital that is developed at universities. The recruitment processes are focused on recruiting the best candidates for each vacancy. The companies need not only the technical competence; they seek those who demonstrate broader skills such as: ethical and professional responsibility, social awareness and sustainability, teamwork, communication, information, gathering, problem definition, idea generation, evaluation and decision making, implementation capacity, teamwork, and the capacity for life-long learning (5) (6) (7) (8) (9) (10).

Rao et al (2002) conducted a study concluding that "experienced employees and new university graduates, cooperation with other firms, product market competition, and government support for R & D, training, and technical assistance are the drivers of innovation" (11). For instance, the 3M Company is looking for "inventorpreneurs". Inventorpreneur is a person that "invents or creates a new product that fulfils a defined need, promotes the new opportunity or product, manages, organizes and assumes many risks in establishing a new business based on that product " (12).

It is important to recognize that the ability to innovate is not learned in one course. This means that the ability to innovate is the result of various skills acquired through academic life. The integration of attitudes, skills and knowledge is known as competition (13) (14). The sum of competences known is known as a meta-competence. Radcliffe states that the innovative competence is a meta-attribute. "It is not a merely another set of knowledge or skills to be taught in addition to the regular curriculum" (9).

The questions are **which are the most important innovation characteristics and skill that university students need to develop? And which are the most powerful educational elements that promote the innovation skills?**

b. What population or populations will be sampled?

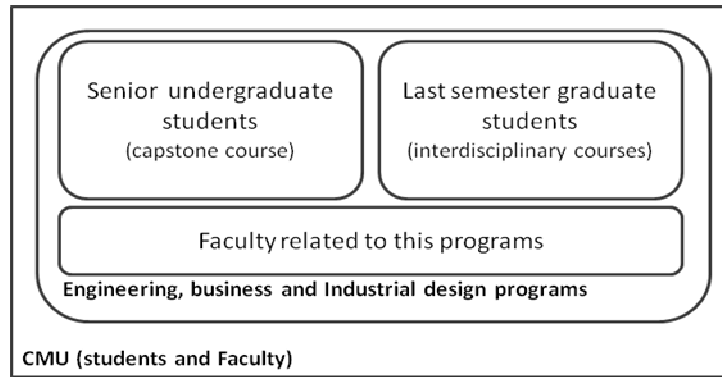
The target population is students and teachers of engineering programs, industrial design and business. The student population of interest is those that are in their last year in both undergraduate and graduate studies.

In order to make comparisons, in undergraduate level we will look for students who have not taken, taken and are taking the capstone courses (senior design project or similar). Similarly, in graduate level we will meet at students who have not taken, taken or are taking an interdisciplinary course focused on product development or similar. This will allow us to identify the added value in terms of innovative features of these courses and the environment that provides CMU.

Faculty of interest is those related to the programs of engineering, business and industrial designers. These teachers should have more than five years working at CMU. To identify the characteristics of CMU environment is necessary to survey students and faculty who the complete CMU experience.

c. What population(s) do you wish to make inferences about? How does it (do they) differ from the population in (b.)?

We want to make inference about the senior students, graduate students, and faculty that teach courses in those levels.



d. How do you plan to carry out the survey (e.g. by telephone), and why?

In order to know our student population we propose the next steps. **First** identify the student population that is taking the capstone and interdisciplinary courses. **Second** identify the student population that has taken the capstone and interdisciplinary courses. **Third** deducted the identified populations (taken and taking) from the total engineering, business and industrial designers population. Once identified the population we can use different ways to collect data for each student populations:

1. Student that have not taken or are taking the capstone and interdisciplinary courses: **self-report via the internet.**
2. For students that are taking the capstone and interdisciplinary courses: **Face-to-face interviews and self administered interviews in the classroom**

Similarly with the student population, it is important to obtain the faculty populations. We have two important sub-populations: first, faculty that is teaching in a program mentioned above and second faculty related with the capstone and interdisciplinary courses. For these faculty groups we propose to use interviews.

Using the method of interview- face to face we can get information beyond the survey. The results are superior to those achieved by a method of self-administered or self-report online. Interviews may be useful as follow-ups to certain respondents to questionnaires, e.g., to further investigate their responses (16).

e. What variables do you propose to measure?

We classified the variables in two dimensions: **Characteristics** are related with the traits, skills, and attitudes of education actors (students and professors). **Educational elements** are related with school environment, facilities, curriculum, courses, and special program.

Regarding the attitudes we will be evaluate challenge-seeking, being a genuine team player, self-directed and autonomous, responding positively to external pressures, not retreating, but keep striving accept defeat, desire to keep learning, intellectual flexibility, and developing creative tasks. With regard to the skills we will be taking into account the following: credible and effective in their area of professional expertise, able to blend these technical skills with business acumen, be interested in the commercial aspects, and able to integrate knowledge from different sources or course (5) (6) (7) (8) (9) (10).

To evaluate the traits, we follow the model of 3M which is shown in the table below (12):

Traits and dimensions (3M)					
Creative	Broad interests	Problem solver	Self-motivated/energized	Strong work ethic	Resourceful
insightful/intuitive	Eager to learn	Experimental (do it first, explain later)	Self-starter/driven	Committed	Networks
Inquisitive/asks questions	explores ideas with others	tinkers with things (hands-on)	results-oriented, sense of contribution	works in cycles	gets things done through others
explorative, looks for solutions	multidisciplinary	not afraid to make mistakes	passionate about what they do	flexible work habits (not structured)	
ideas flow easily	hobbies	willing to explore the unobvious	accomplished and wants to succeed	drives towards completion	
visionary		practical	sense of humor	tenacious	
		takes multiple approaches to a problem	value and purpose		

Finally, to assess the educational elements we will explore aspects of academic culture, the facilities, curriculum, teaching methods, among others (9).

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