Carnegie Mellon University

This all looks great except that I don't see any informed consent statement/form for respondents.

PIs do create this before starting the survey.

-BJ

For IRB Office Use

IRB No:_____

Rec'd:_____

APPLICATION FOR IRB REVIEW OF RESEARCH INVOLVING HUMAN SUBJECTS

(Not for exempt research)

Please complete this application as thoroughly as possible. Your application should include the following:

1. A consent form using the current CMU template that the participants and/or parent/guardian will be required to sign.
2. A copy of any questionnaires, surveys, images, de-briefings that will be used.
3. A copy of any recruitment documents (including advertisements, flyers, letters, invitations, email) to be used;
4. A copy of the training certificates for all individuals working on the research unless they are on file with the CMU IRB. Training is available at: http://phrp.nihtraining.com/users/login.php
5. If the PI is a student, the faculty advisor must submit a Faculty Advisor Assurance Form.

Please email all documents to irb-review@andrew.cmu.edu. For assistance call CMU Research Compliance @ 412-268-5460 or email irb-review@andrew.cmu.edu. Additional information and templates are available at http://www.cmu.edu/osp/regulatory-compliance/human-subjects.html

1. Protocol		
Title: Individual's characteristics and academic elements that promote innovations skills		
☐ This is a previously approved study that has lapsed.	Previous IRB No: HS	
2. Principal Investigator (PI)		
Name:	Department:	
Telephone:	E-mail:	Training Cert. ☐ Attached ☐ On File
☐ I am a student. If so, please provide information about your faculty advisor below.		
Faculty Advisor Name: Brian Junker	E-mail: brian@stat.cmu.edu	Training Cert. ☐ Attached ☐ On File
If a student is the PI, the faculty advisor must complete and submit a Faculty Advisor Assurance Form.		
If there is someone other than PI to correspond with regarding this protocol, please list below.		
Contact Person Name: GALVAN, JOSE ALFREDO	Telephone:	E-mail: jagalvan@andrew.cmu.edu
Business Manager for your department:	E-mail:	
3. Co-investigators		
Name: BARADARAN SHORAKA, MOHAMMAD	E-mail: mbaradar@andrew.cmu.edu	Training Cert. ☐ Attached ☐ On File
Name: GALVAN, JOSE ALFREDO	E-mail: jagalvan@andrew.cmu.edu	Training Cert. ☐ Attached ☐ On File
Name: LEONTIADIS, NEKTARIOS	E-mail: nleontia@andrew.cmu.edu	Training Cert. ☐ Attached ☐ On File
Name: YANG, CHIA-HSUAN	E-mail: chiahsuy@andrew.cmu.edu	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
4. Funding		
☒ Unfunded research	Sponsor/Source:	

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☐ External Funding	SPEX Proposal #:
☐ Internal Funding	Oracle String:
Grant Title:	
If you don't know the funding/grant information, please get it from your department's business manager.	

5. Protocol Description

Provide, in lay terms, a summary of your proposed study as outlined below. You may attach the protocol to this form if you like.

Purpose of the study. Class project

Describe the research procedures (include the activity, location and time required of the participant). Answearing 30+ questions on line in 5~10 minutes. Please see the project proposal in detail.

Who will be asked to participate?CMU graudate students

Will questionnaires or surveys be used? ☒ Yes ☐ No

Will tasks be done on a computer? ☒ Yes ☐ No If yes, how will the tasks be accessed? ☒ Remotely via the internet? ☐ In the research lab? ☐ Other, please explain:

Will deception be used? ☐ Yes ☒ No If yes, describe how participants will be debriefed. Please include the de-briefing material and/or script.

Will the research be conducted on the CMU campus? ☒ Yes ☐ No If no, please indicate the location(s).

If applicable, please attach documentation of permission to conduct research in private, non-CMU space.

6. Participants

Will any of the following classes of vulnerable subjects be involved in the proposed study? *(check all that apply)*

Class	*Comments*
Pregnant women, human fetuses ☐ Yes ☐ No ☒ Pregnant women will not be specifically included or excluded. (See http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm, research that is incidental to pregnancy and has no risk to the fetus can only include pregnant women if ALL aspects of Subpart B are met.)	
Neonates ☐ Yes ☒ No	
Prisoners ☐ Yes ☒ No	
Children ☐ Yes ☒ No	

Individuals with compromised mental status ☐ Yes ☒ No If yes, indicate how this will be determined.

Will the participants be capable of understanding the nature of the study and the consent process? ☒ Yes ☐ No
If no, explain.

What is the age range of participants in the proposed study? above 20 years old

How many participants are needed for the study? As many as we get a sample of size 60	How was that number determined?To make the survey's CI as 95% and the margin of error as ± 0.10

What do you estimate the ratio of males to females be? As the ratio shown on CMU factbook Will this be reflective of the local population? ☒ Yes ☐ No Will you target a certain population? ☒ Yes ☐ No Please explain CMU graduate students in Engineering, Business, and industrial Design departments

What do you estimate the percentage of minorities will be? Not relavant to the project

Please list inclusion and exclusion criteria. inclusion criteria: MU graduate students in Engineering, Business, and industrial Design departments

7. Participant Recruitment

Describe how participant recruitment will be performed. Include how and by whom potential participants are

introduced to the study. Please see the sampling scheme part in the project proposal. (on page 3)

Check all boxes below that apply.

☒ CMU directory	☐ Postings, Flyers	☐ Radio, TV

☒ E-mail solicitation Indicate how the email addresses are obtained:on-line CMU directory

☐ Web-based solicitation. Specify sites:

☐ Participant Pool. Specify what pool:

☐ Other, please specify:

Please attach any recruiting materials you plan to use and the text of e-mail or web-based solicitations you will use.

8. Consent

Do you plan to use consent forms? ☒ Yes ☐ No

If no, you must complete the section below on waiver of informed consent.

If yes, describe how consent will be obtained and by whom. A front page before the on-line survey for everyone

If participants are minors will assent forms be used? ☐ Yes ☒ No If No, please explain. N/A

Will the consent form be presented on paper or online? ☐ Paper ☒ Online

Are you requesting to use a consent format that is different from the CMU model consent? ☐ Yes ☒ No

If yes, please explain.

Are you requesting a waiver of informed consent? ☐ Yes ☒ No

If yes, please explain how each of the elements listed apply to your study:

1. The research involves no more than minimal risk to the subjects;
2. The waiver will not adversely affect the rights and welfare of the subjects;
3. The research could not practicably be carried out without the waiver and ;
4. Whenever appropriate, the subjects will be provided with additional pertinent information after participation.

Are you requesting a waiver of written documentation (signed) of informed consent? ☐ Yes ☒ No

If yes, please answer the following questions.

1. Will the only record linking the participant and the research be the consent document and the principal risk to the participant harm would be from breach of confidentiality? ☐ Yes ☐ No
2. Do you consider this a minimal risk study that involves no procedures for which written consent is normally required outside of research? ☐ Yes ☐ No

9. Risks and Benefits

Will participants receive intangible benefit from the study? ☐ Yes ☒ No

Discuss the direct and indirect benefits to participants.

Discuss the risks to participants. No risk

Discuss how any risks will be managed and/or minimized.

If deception is involved, please explain.

Indicate the degree of physical or psychological risk you believe the research poses to human subjects *(check which one applies).*

☒ Minimal Risk: A risk is minimal where the probability and magnitude of harm or discomfort anticipated in the proposed research are not greater, in and of themselves, than those ordinarily encountered in daily life of during the performance o routine physical or psychological examinations or tests.

☐ Greater than Minimal Risk: A risk is greater than minimal where the probability and magnitude of harm or discomfort anticipated in the proposed research are greater than those ordinarily encountered in daily life or during the

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performance of routine physical or psychological examinations or tests.
Describe how the study fits in this risk level. No risk is expected

10. Participant Compensation and Costs

Are participants to be compensated for the study? ☐ Yes ☒ No If yes, what is the amount, type and source of funds?

Amount:	Source:	Type (gift card, cash):

Will participants who are students be offered class credit? ☐ Yes ☒ No

Are other inducements planned to recruit participants? ☐ Yes ☒ No If yes, please describe.

Are there any costs to participants? ☐ Yes ☒ No If yes, please explain.

Will you compensate participants for injury resulting from participation? ☐ Yes ☐ No ☒ NA If yes, please describe.

11. Confidentiality and Data Security

Will personal identifiers be collected? ☐ Yes ☒ No | Will identifiers be translated to a code? ☐ Yes ☒ No

Will recordings be made (audio, video)? ☐ Yes ☒ No If yes, please describe.

Is the information so sensitive that you will obtain a certificate of confidentiality from NIH? ☐ Yes ☒ No

Who will have access to data (surveys, questionnaires, recordings, interview records, etc.)? Investigators

Describe how you will protect participant confidentiality and secure research records (Will they be stored on a secure computer, locked cabinet, etc?). Stored on a secured computer

Describe your process for monitoring data to ensure that study goals are met. (Review of lab notebooks, meetings to review data, etc.) meetings to review data

12. Conflict of Interest

Do you or any individual who is associated with or responsible for the design, the conduct of or the reporting of this research have an economic or financial interest in, or act as an officer or director for any outside entity whose interests could reasonably appear to be affected by this research project: ☐ Yes ☒ No

If yes, please provide detailed information to permit the IRB to determine if such involvement should be disclosed to potential research subjects.

13. Cooperating Institutions

Is this research being done in cooperation with any institutions, individuals or organizations not affiliated with CMU?
☐ Yes ☒ No If yes, please list and describe their role.

Have you received IRB approval from another IRB for this study? ☐ Yes ☒ No ☐ Pending
If yes, please attach a copy of the IRB approval.

If applicable, please provide the name(s) and address(es) of all officials authorizing to access human subjects in cooperating institutions not affiliated with CMU. N/A

Please attach documentation of approval.

Principal Investigator's Assurance Statement for Using Human Subjects in Research

I certify that the information provided in this IRB application is complete and accurate.

I understand that as Principal Investigator, I have ultimate responsibility for the conduct of IRB approved studies, the ethical performance of protocols, the protection of the rights and welfare of human participants, and strict adherence to the studies protocol and any stipulations imposed by Carnegie Mellon University Institutional Review Board.

I understand that it is my responsibility to ensure that the human participants' involvement as described in the funding

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proposal(s) is consistent in principle, to that contained in the IRB application. I will submit modifications and/or changes to the IRB as necessary.

I agree to comply with all Carnegie Mellon University policies and procedures, as well as with all applicable federal, state, and local laws, regarding the protection of human participants in research, including, but not limited to:

- Ensuring all investigators and key study personnel have completed human subjects training program;
- Ensuring protocols are conducted by qualified personnel following the approved IRB application;
- Implementing no changes in approved IRB applications or informed consent documents without prior IRB approval in accordance with CMU IRB policy (except in an emergency, if necessary to safeguard the well-being of a human participant, and will report to the IRB within 1 day of such change);
- Obtaining the legally effective informed consent from human participants or their representative, using only the currently approved date-stamped informed consent documents, and providing a copy to the participant.
- Ensuring that only IRB-approved investigators for this study obtain informed consent from potential subjects.
- Informing participants of any relevant new information regarding their participation in the research that becomes available.
- Promptly reporting to the IRB any new information involving risks to research participants, including reporting to the IRB, Data Safety and Monitoring Boards, sponsors and appropriate federal agencies any adverse experiences and all unanticipated problems involving risks to human subjects or others that occur in the course of the research.
- If unavailable to conduct research personally, as when on sabbatical leave or vacation, arrangements for another investigator to assume direct responsibility for studies will be made through modification requests to the IRB;
- Promptly providing the IRB with any information requested relative to protocols;
- Promptly and completely complying with IRB decisions to suspend or withdraw approval for projects;
- Obtaining Continuing Review approval prior to the date the approval for a study expires (approval for the study will automatically expire);
- Maintaining accurate and complete research records, including, but not limited to, all informed consent documents for 3 years from the date of study completion;
- Informing the CMU IRB of all locations in which human participants will be recruited for protocols and being responsible for obtaining and maintaining current IRB approvals/letters of cooperation when applicable;
- Complying with federal, state and local laws and regulations and sponsor terms and conditions; and
- Complying with CMU policies on the responsible conduct of research.

_____ _____

Principal Investigator Name and Signature Date

Note: If e-mailed from the PI's CMU e-mail account a hand written signature is not needed. Please type in name and date. If the PI is a student, the faculty advisor must submit a Faculty Advisor Assurance Form.

Please email all documents to irb-review@andrew.cmu.edu.

Note: Links to the policies and Federal regulations for the protection of human research subjects (including the Code of Federal Regulations [.CF.R.] Title 45 CFR Part 46 and Title 21 C.F.R. parts 50 and 56) are available on the IRB web page (http://www.cmu.edu/provost/spon-res/compliance/hs.htm).

Comments:

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IRB No:_____

Rec'd:_____

Template for Online Consent

This survey is part of a research study conducted by Jose Alfredo Galvan Galvan at Carnegie Mellon University.

The purpose of the research is to identify the characteristics that a university should have, in general, to develop and boost the innovation capability of its graduates.

Procedures
The participants are expected to answer a number of questions. The expected duration of participation is 5 minutes.

Participant Requirements
Participation in this study is limited to individuals age 18 and older.

Risks
The risks and discomfort associated with participation in this study are no greater than those ordinarily encountered in daily life or during other online activities. [Describe risks specifically related to the study such as boredom or fatigue. If the research activity involves the use of confidential or financial information, include a statement about internet security.]

Benefits
There may be no personal benefit from your participation in the study but the knowledge received may be of value to humanity.
Compensation & Costs
There is no compensation for participation in this study

There will be no cost to you if you participate in this study. [If applicable, delete the foregoing and list any costs associated with participation in the study]

Confidentiality
The data captured for the research does not include any personally identifiable information about you. Your IP address will not be captured.

By participating in this research, you understand and agree that Carnegie Mellon may be required to disclose your consent form, data and other personally identifiable information as required by law, regulation, subpoena or court order. Otherwise, your confidentiality will be maintained in the following manner:

Your data and consent form will be kept separate. Your consent form will be stored in a locked location on Carnegie Mellon property and will not be disclosed to third parties. By participating, you understand and agree that the data and information gathered during this study may be used by Carnegie Mellon and published and/or disclosed by Carnegie Mellon to others outside of Carnegie Mellon. However, your name, address, contact information and other direct personal

identifiers in your consent form will not be mentioned in any such publication or dissemination of the research data and/or results by Carnegie Mellon.

Right to Ask Questions & Contact Information
If you have any questions about this study, you should feel free to ask them by contacting the Principal Investigator now at [Insert the name and title of principal investigator, Department, address city, state, zip, phone number, e-mail address]. If you have questions later, desire additional information, or wish to withdraw your participation please contact the Principle Investigator by mail, phone or e-mail in accordance with the contact information listed above.

If you have questions pertaining to your rights as a research participant; or to report objections to this study, you should contact the Research Regulatory Compliance Office at Carnegie Mellon University. Email: irb-review@andrew.cmu.edu . Phone: 412-268-1901 or 412-268-5460.

The Carnegie Mellon University Institutional Review Board (IRB) has approved the use of human participants for this study.

Voluntary Participation
Your participation in this research is voluntary. You may discontinue participation at any time during the research activity.

I am age 18 or older. ☐ Yes ☐
I have read and understand the information above. ☐ Yes ☐ No
I want to participate in this research and continue with the survey. ☐ Yes ☐ No

these look fine but please be sure to give them subject lines that do not cause people to delete without readnig...

Email Invitation:

"Dear [NAME],

We are a group of 4 CMU students that is currently running an on-line survey which intends to identify the importance of different aspects of college life (e.g. facilities, faculty interaction) for the improvement of the innovation abilities of the students.
We would like to invite you to complete the survey. We only request less than 5 minutes of your time. Please follow the link below.

[LINK]

Thanks you in advance,
Jose Alfredo Galvan - jagalvan@andrew.cmu.edu
Nektarios Leontiadis - leontiadis@cmu.edu
Mohammad Baradaran Shoraka - mbaradar@andrew.cmu.edu
Chia-Hsuan Yang - chiahsuy@andrew.cmu.edu
"

Email Reminder:

"Dear [NAME],

We contacted you a few days ago to invite you to complete our on-line survey. Our records indicate that you haven't completed the survey and we would like to request once again that you follow the link at the end of the message and complete it. We only request less than 5 minutes of your time.
As a reminder, this survey intends to identify the importance of different aspects of college life (e.g. facilities, faculty interaction) for the improvement of the innovation abilities of the students.

[LINK]

Thanks you in advance,
Jose Alfredo Galvan - jagalvan@andrew.cmu.edu
Nektarios Leontiadis - leontiadis@cmu.edu
Mohammad Baradaran Shoraka - mbaradar@andrew.cmu.edu
Chia-Hsuan Yang - chiahsuy@andrew.cmu.edu

S10 36-303 Sampling, Survey and Society

Project : Individual's characteristics and academic elements that promote innovations skills

Project group E
BARADARAN SHORAKA, MOHAMMAD (mbaradar@andrew.cmu.edu)
GALVAN, JOSE ALFREDO (jagalvan@andrew.cmu.edu)
LEONTIADIS, NEKTARIOS (nleontia@andrew.cmu.edu)
YANG, CHIA-HSUAN (chiahsuy@andrew.cmu.edu)

Innovation is a subject of much relevance. 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 that 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. In which 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).

It is becoming increasingly relevant and important features 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 to 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 "invetorpreneurs". 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 are not learned in one course, this means the ability to innovate pair 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).

What question do you propose to study?

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

What population or populations will be sampled?

The target population is the graduate – master and PhD – students of CMU whose area of research or curriculum is relative to engineering, industrial design or business administration.

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

Our sampling frame is students who meet the target population criteria and who have, in addition, the following characteristics (one or more):

- Are graduating within the year
- Have passed their qualification exams
- Have working experience either while attending their current graduate program or before

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

In order to obtain a sample from the sampling frame, we are going to request a list of the email addresses of all the currently enrolled graduate students (i.e. C-Book). Having this list, we will select randomly a number of email addresses to which we will send invitations for participation to an online survey. The survey questions will include an initial part where the student will either position or not him/her---self into the sampling frame by answering a few specific questions.

The number of the invitations that will be sent will be based on an estimation of the percentage of graduate students that fit into our sampling frame related to the whole population of graduate

students and a prediction the email response rate, so that we will manage to reach the desired sample size.

Regarding the non---response issue, there are two possible ways to deal with it. The first is to estimate a rough non---response rate based on similar surveys and send that much more email invites, and send out reminders, if necessary. The second approach is to create multiple sample pools, based on the entire pool of email addresses. Each pool will contain the same size of random email addresses and each email address may exist only within one sample pool. Also, each pool will receive a single random numeric identifier. Based on this setup, we will send out invitations to sample pool 1 and allow some predefined time to receive responses. At the end of the period we will check if we have the desired amount of responses. If not, we will initiate a second round of invite sending to sample pool 2. This process will continue until we have reached the desired amount of responses. If we run out of available sample pools without reaching the desired sample size, we will initiate one or more rounds of random follow---ups, based on the time available. If this does not work out, we will work with the available responses, stating the resulting sampling error.

I like some form of followup in the earlier pools as well, otherwise you are just getting "easy responders" in each pool, which may be different from others who require reminders (they may be more focused and less likely to answer random surveys for example; this could affect your results on qualities needed for successful innovation)

What variables do you propose to measure?

We classified the variables in two dimensions:
Characteristics are related with the skills and attitudes that the graduate students need to be more innovative in their future jobs.

Educational elements are related with school environment, facilities, curriculum, courses, and special programs that help students theirs innovative characteristics.

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

The pretest report and final questionnaire

See appendix.

Sampling scheme

The sampling scheme that we are going to use for this survey will be the Simple Random Sampling (SRS) without replacement scheme. We are not using any clustering or stratification scheme because we are not interested in the characteristics of the subgroups that exist within our population and sampling frame (e.g. students from different departments). Instead our goal is to generate inferences about innovation concepts for the population as a whole. The equal

probability selection method that is utilized in the SRS without replacement scheme is the most appropriate tool to achieve this goal.

Sampling Size

Sample size needed

Based on the Carnegie Mellon University 2009-2010 Factbook (17) there are 2400 graduate students enrolled in Engineering, Business, and industrial Design departments.

We are using the 5 points scale for the answers. The worst case will be when the respondents answer 5 scales in an equal amount which will cause the probability of each scale to be 20%. Therefore, the standard deviation will be 0.4, as shown below.

$$SD = \sqrt{p(1-p)} = \sqrt{(0.2) \times (1-0.2)} = 0.4$$

please be sure that margin of error of 10% will give you enough precision for interesting results.

The confidence interval we chose for our survey is 95% and the margin of error is ±0.10. The reason why we chose the ±0.10 margin of error is that this is a scientific experiment and there are a lot of unknown facts and assumptions that could affect the results. ✓

Our sampling method is SRS without replacement, so we will need n=60 respondents so that we could fulfill this confidence interval and margin of error which is calculated as:

$$N = 2400\ persons$$

$$SD = 0.4$$

$$ME = 0.1$$

$$n_0 = \frac{z_\alpha^2 \times SD^2}{ME^2} = \frac{1.96^2 \times 0.4^2}{0.1^2} = 61.46$$

$$n \geq \frac{Nn_0}{N + n_0} = \frac{2400 \times 61.46}{2400 + 61.46} = 59.93 \rightarrow n = 60$$

We know that if we would like to improve the margin of error to ±0.07 with the same confidence interval and standard deviation, we will need twice the amount we need now, which will be 120 respondents. And for a margin of error of ±0.05 we will need 223 respondents.

The response rate we expect to get is about 25%. So as we need to have a sample of size 60, we need to approach 240 students.

Reference cited

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(5) McClelland, D. C. 1973, "Testing for competency rather than for intelligence", *American Psychologist, Vol. 28, pp. 1-14.*
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Pre-test Report

We did the pre-test on 12 people giving the questionnaire in print and asking them to fill out the survey and give us there opinions if any. As a result we derived the top 5 skills in each category to more research on them for the final questionnaire.

In order to simplify the questionnaire the format of essential words were changed to bold or italic. Some question parts were deleted. Few minor grammar and spelling mistakes were corrected.

Overall it seemed that the questionnaire was fluent and they had no difficulties understanding the contents of it. The final questionnaire is attached below.

Survey: Individual's characteristics and academic elements that promote innovations skills

Section I. Demographic questions (*Choose one of the options or write your answer*)

1. Are you female or male? O **Female** O **Male**
2. What is your nationality? _____
3. How old are you? O **20-25** O **26-30** O **31-35** O **36-40** O **41 or more**
4. What was your major/academic program in university/before you entered CMU? _____
5. Did you have any work experience before joining CMU? O **Yes** O **No**
6. If yes, how many years did you work? O **1-5** O **5-10** O **11-15** O **16 or more**
7. Have you ever done an internship? O **Yes** O **No**
8. If yes, for how long (months)? O **1-2** O **3-4** O **5-6** O **7 or more**
9. Are you a graduate student? O **Yes** O **No**
10. What will your final degree be at CMU? O **Master** O **PhD**
11. If it is PhD, have you taken the qualification exams? O **Yes** O **No**
12. Are you graduating within this year? O **Yes** O **No**

Section II. Individual's characteristics and academic elements questions

13. Do you think that having a "*Creative approach*" is an important **characteristic** to be innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

14. Do you think that being "*Self-driven and persistent*" is an important **characteristic** to be innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

15. Do you think that being "*Resourceful and shrewd*" is an important **characteristic** to be innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

16. Do you think that being "*Initiator of change*" is an important **characteristic** to be innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

17. Do you think that being "*Highly future oriented*" is an important **characteristic** to be innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

18. Do you think that "*Challenge Seeking*" is an important **attribute** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

19. Do you think that "*Persistence*" is an important **attribute** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

Survey: Individual's characteristics and academic elements that promote innovations skills

20. Do you think that "*Curiosity*" is an important **attribute** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

21. Do you think that "*Commitment*" is an important **attribute** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

22. Do you think that being "*Aggressively ambitious*" is an important **attribute** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

23. Do you think that "*Integrity*" is an important **value** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

24. Do you think that being "*Respectful to others*" is an important **value** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

25. Do you think that "*Peace*" is an important **value** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

26. Do you think that "*Freedom*" is an important **value** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

27. Do you think that "*Personal and social responibility*" is an important **value** for being innovative?

Strongly disagree				Strongly agree
1	2	3	4	5

28. Which kinds of **knowledge** listed below you think are important to be innovative?
*(Please **rank** them all and add others if necessary)*

	Business knowledge (business plan, marketing, market needs, etc)
	Technical knowledge (Technology, methods, engineering, production, etc)
	Design Knowledge (conceptualization, creativity, form, ergonomic issues, etc)
	Law or legal Knowledge (intellectual property, contract, agreement, etc)
	Others:

29. Do you agree that the **contribution of CMU culture** is important to innovation ability?
(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

30. Do you agree that the **impact of your academic department's culture** is important for innovation promotion?
(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

Why?

a. Which part(s) do you think is good? _____
b. Which part(s) do you think is not good enough? _____
c. How to improve it? _____

31. Do you agree that the influence of **CMU facilities**, like libraries, laboratories, classrooms, gyms and business incubators, are important for improving students' innovation ability?

(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

Why?

a. Which part(s) do you think is good? _____
b. Which part(s) do you think is not good enough? _____
c. How to improve it? _____

32. Do you agree that **CMU faculty skills** are important in improving students' innovation ability?

(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

33. Do you agree that the effect of **academic activities** (like seminars, meetings, etc.) in CMU is important in improving students' innovation ability?

(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

Why?

a. Which part(s) do you think is good? _____
b. Which part(s) do you think is not good enough? _____
c. How to improve it? _____

34. Do you agree that the impact of your **classmates and/or colleagues in CMU** is important in improving your innovation ability?

(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

35. Do you agree that the **curriculum in your program** has a significant effect in fostering a student's innovation ability?

(Choose one option that you think is most suitable and answer the following questions)

Strongly disagree				Strongly agree
1	2	3	4	5

Why?

a. Which part(s) do you think is good? _____
b. Which part(s) do you think is not good enough? _____
c. How to improve it? _____