Board 120/Lessons Learned: ”I Can’t Build It Because They Won’t Come”: Faculty Survey Response Rates in Engineering Education Research

Dr. Rachel Ziminski, University of Massachusetts, Lowell

Rachel Ziminski recently received her Ph.D. in the Leadership in Education program at the University of Massachusetts Lowell. Her research interests include engineering education, faculty influence on student persistence, faculty teaching preparation and creating an environment of continuous learning in higher education. Her current research focuses on faculty influence on underrepresented minority student persistence in engineering education. Rachel has served in various administrative and leadership positions in academic affairs and student affairs at the University of Massachusetts Lowell, MIT and Wentworth Institute of Technology. She holds a bachelor’s degree in business management from Bentley University and a master’s degree in administration of higher education from Suffolk University.

Dr. Yanfen Li, University of Massachusetts, Lowell

Dr. Yanfen Li is an Assistant Professor in Biomedical Engineering at the University of Massachusetts Lowell. She received her Ph.D. in Bioengineering from the University of Illinois at Urbana Champaign in 2018. Dr. Li has extensive experience in engineering education focusing on recruitment and retention of underrepresented and under resourced students and engineering pedagogy. Her work spans the areas of curriculum instruction and design, program design and evaluation, and the first-year college experience. Dr Li’s research group aims to further the development of a diverse workforce in engineering and STEM. She is the PI of a NSF Scholarship in STEM grant aimed at supporting high achieving, low-income students to complete their bachelor’s degrees and continue on to graduate school. She has received several teaching awards including the UMass Lowell Award for Excellence in Innovative Teaching in 2021 and the Biomedical Engineering Teaching Award from the American Society for Engineering Education in 2021.

Lessons Learned: "I Can't Build It, Because They Won't Come:" Faculty Survey Response Rates in Engineering Education Research

Obtaining faculty perspectives to enhance higher education teaching practices is an essential step in assessing and planning professional development and training. However, procuring this crucial feedback can often feel like an insurmountable challenge. In a recent research study aimed at gathering faculty feedback through an anonymous online survey, a notable revelation emerged – faculty members exhibit reluctance to participate in surveys. The question that arises is, how can we gain an understanding of the collective faculty perspective for professional development initiatives?

Through quantitative analysis and insights drawn from the data collection process, the study unearthed some limitations during survey recruitment. It suggests that exploring changes in recruitment methods may be necessary to increase faculty participation. The aim of this paper is to understand potential barriers to faculty participation by examining response rates from a recent study conducted by the authors and propose changes that could potentially increase response rates for future studies. To achieve this, the study design and response rate outcomes are examined, followed by suggestions for modifications in survey recruitment.

Background

Social science research delves into the exploration of human behavior, aiming to identify the underlying reasons that drive it. Employing the scientific method, this research involves posing questions, formulating hypotheses, conducting empirical studies, drawing conclusions, and critically assessing the findings. Unlike other forms of research, social scientists employ theory to develop constructs that align with the data [1]. This approach relies on participants understanding the importance of survey completion and their motivation to participate.

Research on survey design and recruitment content underscores the significance of various factors, including the placement of the survey link, the clarity of the time commitment required for participation, the content of the messaging, and the timing between the invitation, reminders, and survey deadline [2] – [4], [7] – [9]. Most of the research on survey recruitment in education centers around student survey recruitment. While there are helpful suggestions and information in this line of research, it does not align with the research on faculty survey participation or the experiences of the authors in the recent study conducted.

Studies regarding survey response rates were minimal concerning faculty participation. In contrast to most cited studies, faculty participants may not fit the "norms" of considerations. One study [8] found that positioning the survey link at the bottom of the email led to an uptick in faculty response rates. They speculated that this placement might encourage recipients to read the entire message, thereby enhancing the perceived legitimacy of the request and motivating participation. Interestingly, contrary to conventional beliefs, longer invitation messages, as opposed to shorter ones, were found to increase faculty participation rates. The study also found that specifying different time commitments, such as "less than 10 minutes" versus "up to 30

minutes," did not yield discernible differences in faculty participation. One notable finding was the use of an authority figure in the subject line [8], such as the institution's Vice President, significantly boosted faculty response rates. While replicating an authority figure in the subject line might not be feasible for all survey studies, it does serve as a valuable consideration during the study design phase.

A recent study conducted by the authors aimed to understand engineering faculty practices in providing encouragement to students in academic settings. The quantitative study used an online survey instrument to gather data from engineering faculty. The first component of the study used a pilot study to test the survey instrument. This pilot study yielded a low participation rate (5.3%). In a meta-analysis study on survey response rates in education [9], findings revealed an average of 44%. Results from the pilot study were in stark contrast to the average response rate in educational research. This led the researchers to reconsider their recruiting approach for their broader study.

Study Recruitment and Data Collection

Due to the specific criteria requiring participants to be engineering faculty members at U.S. higher education institutions, a non-probability sampling method was employed. To achieve the study's goal of significant statistical power, it was determined that the sample population needed to be increased. Self-selection sampling was used to attract a broader pool of potential participants who could choose to participate, ultimately increasing the sample size.

This multi-step process began with compiling a list of institutions resulting from searches for large engineering programs at higher education institutions in the US. The search aimed to create a large pool of potential participants and target institutions by region to ensure faculty representation from across the country. Three institutions were selected for each region and then categorized by size (student population), research classification, institutional type, and location of the campus. These categories provide additional information on the types of institutions from which participants were recruited.

Table I
STUDY RECRUITMENT INSTITUTIONS

Region	Size	Carnegie Classification	Public/Private	Location
Northeast	M	R2	Public	Suburban
	M	R1	Public	Suburban
	L*	R1*	Public*	Urban*
Southeast	L	R1	Private	Urban
	L	R1	Public	Urban
	L	R1	Public	Suburban
Midwest	L	R1	Public	Suburban
	L	R1	Public	Suburban
	L	R1	Private	Suburban
Southwest	M	R1	Private	Urban
	L	R1	Public	Suburban

	L	R1	Public	Urban
West	L	R1	Public	Urban
	L	R1	Public	Urban
	M	D/PU	Private	Urban

Size is denoted by student population (M = 5,000-15,000 students; L = over 15,000 students).
* Items identified with * indicate the institution did not participate in the study.

The home institution's Institutional Review Board reviewed the study and determined the activities as exempt from IRB oversight. Once approved, a 26-item structured survey was administered online using Qualtrics survey software. Data collection took place from August 31, 2023, to January 5, 2024. An initial request to distribute the survey was emailed to each institutional review board (IRB). Once authorized, an invitation was sent to engineering department Chairs for each discipline of engineering at every higher education institution selected for permission to distribute. After receiving approval to distribute, an invitation was sent to each faculty member with a link to the online survey. A reminder email was sent individually to each faculty member two weeks after the initial invitation.

Participant Response Rates

The survey was anonymous, limiting data analysis. Response rates were calculated based on invitations sent and survey participants by type and size of institution.

Table II
RESPONSE RATES BY INSTITUTION TYPE AND SIZE

Institution Type & Size	Institutions	Faculty Invited	Participants	Response Rate (%)
Public university (over 15K students)	8	2822	162	5.7
Private university (over 15K students)	2	456	16	3.5
Public university (5-15K students)	2	180	26	14.4
Private university (5-15K students)	2	167	31	18.6

Lessons Learned

Response Rates and Increasing Participation

The response rate results contradicted the expected outcomes determined during recruitment planning, which considered larger institutions with a higher number of engineering faculty as a large potential participant pool. Results indicate that mid-sized institutions (5-15K students) of both public and private status had higher response rates (14.4-18.6%). In contrast, larger institutions (over 15K students), public and private, had low response rates (3.5-5.7%). This was surprising given the meta-analysis study [9] indicating an average of 44% response rates in education studies. However, the results from the authors' pilot study (5.3%) at a large public institution were similar to the results in the larger study of response rates from large public institutions (5.7%).

Results from this analysis suggest that regardless of the response rate, larger institutions garnered the majority of participants. For future studies, determining the goal of either number of participants or response rate, will dictate recruitment. If the goal of the research is to have as many participants as possible, it is still important to recruit from large institutions. Conversely, if the goal of the research is to understand perspectives from one institution, the results of this analysis suggest that researchers may want to consider focusing on medium-sized institutions. It's worth noting that smaller institutions were not included in this study, which could be an avenue for exploration in future studies.

Another consideration to enhance participation is the timing of the survey invitation. In the authors' study, recruitment efforts commenced on August 31 and extended until January 5. Every attempt was made to steer clear of major holidays, semester mid-terms, finals, and breaks. However, timing remains a factor that may have influenced faculty participation.

Incentives

No incentive was provided for completion of the survey. Studies of survey response rates suggest a potentially higher rate when offering incentives, whether individual or through a drawing [2] – [4], [7] – [9]. While this approach may enhance participation, researchers must carefully weigh the implications of incentivizing anonymous surveys. Gathering personal identifiable information for incentive distribution could potentially deter honest feedback or discourage survey participation due to concerns about privacy or anonymity.

Disconnect Interpreting Study Aims

There is a difference in research approaches between social science researchers and engineering science researchers [5]. If we use the learning environment as the grounds for a study and compare research approaches, we may notice that while engineers are researching the mechanics and materials in the learning environment using the engineering design process, social scientists are researching human interaction and behavior in the learning environment using quantitative or qualitative methods. Engineers typically use the engineering design process using experiments to test hypotheses. The equivalent stage in social science is using a survey instrument to measure human behavior.

The disconnect between social science and engineering researchers was observed by an engineering education research team consisting of both engineers and social scientists in a study presented as a “lessons learned” paper to ASEE in 2020 [6]. The team learned from their own experience that the disconnect between research approaches created obstacles in communication and misunderstandings around study designs and the level of importance given during stages of the research. These misunderstandings were mostly due to the differences in research approaches taken within the disciplines.

Understanding the importance of communication around study design and the level of importance for stages as established in [6], it suggests that the engineering faculty invited to participate in the survey may not have been given strong enough messaging to increase participation. This limitation could be prevented through pre-testing the study messaging.

Future Directions

The purpose of presenting this analysis is to bring awareness to the challenges faced when surveying faculty. Study design, particularly study recruitment and messaging, requires careful consideration. Making informed decisions regarding recruitment may lead to increased participation from faculty, thereby providing valuable data for creating professional development initiatives. There were a few lessons learned that can be applied to future research as it relates to professional development:

- Solicit feedback from members of the sample population on recruitment messaging prior to launching the survey. This was an oversight in this study. While feedback was gathered regarding items on the survey instrument, no feedback was requested regarding the invitation messaging.
- Consider incentives and how to create protections when gathering personal information to deliver the incentives.
- When planning survey recruitment, careful consideration should be given to the size of the institution. This research suggests targeting medium-sized institutions may be more beneficial for acquiring a high response rate, and large institutions provide a larger potential sample, which is conducive to obtaining a high number of participants.

Conclusion

This *lessons learned* paper addressed some of the difficulties in recruiting faculty participants for surveys. While online surveys are viewed as a more efficient way to gather data from participants located at various institutions across the country, recruitment strategies need to be carefully considered during the study design. Survey results are an important component of understanding the potential needs and obstacles faced by professional development teams in supporting faculty. We hope this work can contribute to efforts aimed at improving recruitment for faculty surveys to provide valuable data for professional development initiatives.

References

[1] A. Bhattacherjee, *Social science research: Principles, methods, and practices*, revised ed. Toowoomba QLD, Australia: University of Southern Queensland, 2012. [Online]. Available: https://open.umn.edu/opentextbooks/textbooks/79. Accessed: February 8, 2024.

[2] B. Holtom, Y. Baruch, H. Aguinis, and G. Ballinger, "Survey response rates: Trends and a validity assessment framework," *Human Relations*, vol. 75, no. 8, pp.1560-1584, 2022, doi: 10.1177/00187267211070769.

[3] V. Menon, and A. Muraleedharan, "Internet-based surveys: relevance, methodological considerations and troubleshooting strategies," *General Psychiatry*, vol. 33, no. 5, 2020, doi: 10.1136/gpsych-2020-100264.

[4] R. Sammut, O. Griscti, and I.J. Norman, "Strategies to improve response rates to web surveys: a literature review," *International Journal of Nursing Studies*, vol. 123, no. 104058, 2021, doi: 10.1016/j.ijnurstu.2021.104058.

[5] A. Johri and B.M. Olds, "Situated engineering learning: Bridging engineering education research and the learning sciences," *Journal of Engineering Education*, vol. 100, no. 1, pp.151-185, 2011, doi: 10.1002/j.2168-9830.2011.tb00007.x.

[6] A. Trytten, C.E. Foor, and S.E. Walden, "Social science research in engineering education: Lessons learned," presented at the American Society for Engineering Education national conference, Pittsburgh, Pennsylvania, June 22-25, 2008. https://peer.asee.org/social-science-research-in-engineering-education-lessons-learned.pdf.

[7] J. Daikeler, M. Bošnjak, and K. Lozar Manfreda, "Web versus other survey modes: an updated and extended meta-analysis comparing response rates," *Journal of Survey Statistics and Methodology*, vol. 8, no. 3, pp. 513-539, 2020, doi: 10.1093/jssam/smz008.

[8] M.D. Kaplowitz, F. Lupi, M.P. Couper, and L. Thorp, "The effect of invitation design on web survey response rate," *Social Science Computer Review*, vol. 30, no. 3, pp.339-349, 2012, doi: 10.1177/0894439311419.

[9] M.J. Wu, K. Zhao, and F. Fils-Aime, "Response rates of online surveys in published research: A meta-analysis," *Computers in Human Behavior Reports*, vol. 7, no. 100206, 2022, doi: 10.1016/j.chbr.2022.100206.