



## Transferring In-Class Rapport to a Virtual Classroom in a Technology Entrepreneurship Graduate Engineering Course

PAMELA BHATTI

MELISSA HEFFNER

Georgia Institute of Technology  
Atlanta, GA

### ABSTRACT

The objective of this work is to support our colleagues in building classroom rapport. We share our experiences transitioning an in-class graduate team-based engineering entrepreneurship course to a virtual classroom in Spring 2020. These experiences are placed in the context of fundamental research in rapport-building and online education. In our course, where engineering students must shift out of their comfort zone and interview stakeholders, we demonstrate the importance of establishing rapport to maintain open communication channels for meaningful discussions. The enduring elements of classroom rapport include instructor openness, clear communication/guidelines, and usage of a web-based learning management system.

**Key words:** entrepreneurship, rapport, team-building

### INTRODUCTION

In a graduate course on Technology Entrepreneurship (Tech Entrepreneurship), building classroom rapport is essential in setting the stage for learning and student exchange. Classroom rapport has been studied in a range of disciplines and strong faculty-student rapport has been associated with enhanced student motivation, persistence, and comfort (Bernieri 1988, Deeksha et al. 2019). Importantly, a high-rapport relationship is one of mutual understanding and satisfactory communication (Carey et al. 1986, Altman 1990), and J. H. Wilson et al. (2010) found that rapport was most closely associated with immediacy, or psychological availability.

Communication, shared-understanding, and immediacy are the underpinning of our Tech Entrepreneurship course. Built upon an evidence-based entrepreneurship curriculum, graduate student



## Transferring In-Class Rapport to a Virtual Classroom in a Technology Entrepreneurship Graduate Engineering Course

teams pursue customer discovery exercises where they are guided on how to find compelling needs for products, tools, or services via informal conversations with “users” throughout the course (Huang-Saad et al. 2020). Faculty instructors set a tempo for students that requires rapid investigation and iteration of their chosen problem space, modeling a startup company experience. Therefore, instructor feedback is often direct and to the point. Moreover, there is a fine balance between instructors pushing student teams to dig further into their problem space, allowing them to flounder, and helping them remain resilient. Therefore, high-rapport relationships are essential both between students and instructors as well as within student teams, and well-grounded rapport is critical in ensuring students thrive in a classroom setting that is unfamiliar to most.

Thus, Tech Entrepreneurship is an ideal substrate for developing skills transferrable not only to startups, but also to the workplace or research group. As a mandatory course in the Master of Science in ECE, the class is an opportunity for students to work in diverse teams with the potential for robust multicultural exchange. As an example, at the Georgia Institute of Technology, in the School of Electrical and Computer Engineering (ECE) where the Tech Entrepreneurship course is taught, the graduate student population is 70/30 international/domestic and 33/67 female/male. To bridge students from such broad backgrounds to team formation and interaction, a variety of exercises such as “speed-dating” for team projects, design-thinking, and small-group exercises punctuate the course. With the rapid move to a virtual classroom after 10-weeks of the course, it was paramount that the teaching team (2 co-instructors) maintain class rapport through open communication and an acute level of empathy for the students in the virtual format.

### METHODS

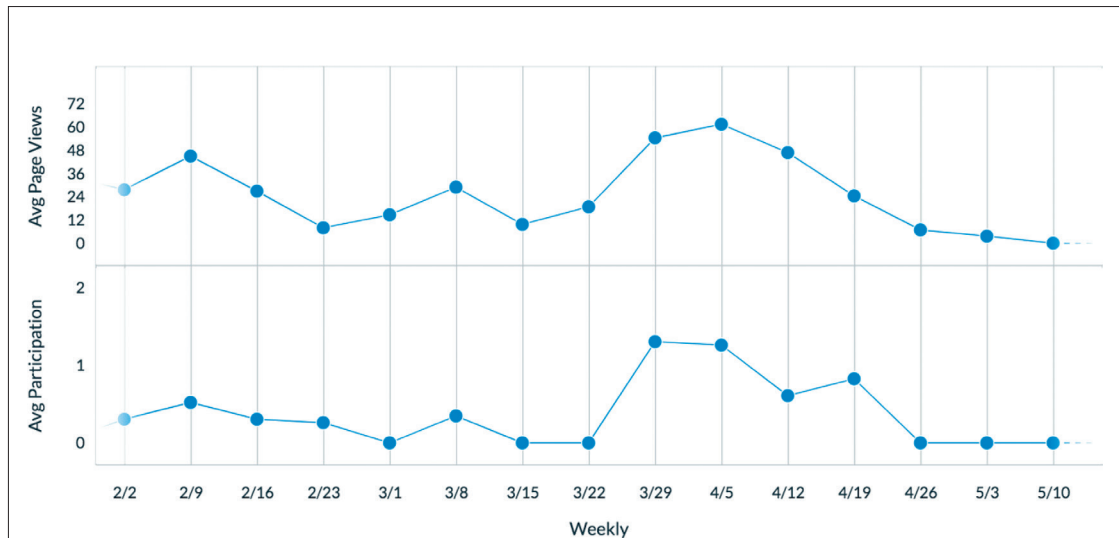
The transformation from in-person delivery to virtual delivery was facilitated via two platforms: a Web based learning management system, Canvas (Instructure, Inc.; Salt Lake City, UT); and video conferencing (BlueJeans Network; San Jose, CA). The transition was accomplished within two weeks. Recognizing that internet access and network performance was likely not equal among all class members and the teaching team, course revision during week one focused on modifications to allow for an asynchronous format, while also retaining all content needed to achieve student competencies. The second week focused on testing and debugging the live virtual classroom. A “town hall” style class meeting was conducted via BlueJeans during this week to discuss a modified syllabus. During the town hall, student deliverables were articulated, adjustment to due dates and submission format was explained, and students were provided with the opportunity to voice concerns and questions. “Pre-pandemic” class percentage scores were tabulated, thereby allowing students to know their



class standing and minimize uncertainty. This was especially important as the University System of Georgia did not modify its grading scheme to pass/fail, which proved stressful for some students.

As a result of the pandemic, many of our students were repatriated to their respective home country and our class was now dispersed around the globe. Accordingly, we exercised the functionalities of Canvas. First, the utility of the system was leveraged as the sole container of content (videos, narrated slide presentations, homework assignments), for assigning and collecting course deliverables, and for online grading. Second, we tracked usage and—expectedly—observed an uptick consistent with the move to online (Figure 1).

Traditionally, the course culminates with each team taking the class through their startup journey sharing their final project thesis (understanding the customer, the problem, existing solution(s)),



**Figure 1. Snapshot of Canvas activity by week. An increase in activity is demonstrated as we moved to a virtual classroom (3/29). We also tracked students to reassure access as they returned quickly to their respective home country during spring break, and/or testing week (3/15-3/29). Access to the Media Gallery, where class recordings resided, and downloading of the revised syllabus exhibited the most activity. Avg. Page Views represents the average approximation of student activity, in viewing pages contained in Canvas (e.g. syllabus). Note, access to recorded class lectures placed in the Media Gallery was not captured in this measure. Our goal was to record lectures as a backup. The primary goal was to employ a flipped-classroom approach and bring students together for live exchange during the class times. Avg. Participation represents activities such as assignments, quizzes, collaborations, and conferences (joining a web conference).**



and what would the team put in place to solve the problem), lessons learned, pivots, and highlights (CREATE-X 2020). For this group of students, their journey was indeed affected by the pandemic and we made three modifications. 1) each student developed their own 7-8-minute presentation with most opting to record voice over PowerPoint and submitted to the teaching team, thus this was not done in real time. 2) A detailed storytelling presentation was developed for the class as a guide and posted on Canvas well in advance of the due date. 3) For the final slide of the presentation students expressed their interpretation of “entrepreneurship in today’s world.” This enabled students to express opinions and feelings that were timely and relevant to the world they each are experiencing.

### PRELIMINARY RESULTS

The first online class after the town hall was a discussion about ethics based on “The Dropout” podcast detailing the Theranos corporation (Jarvis 2019). Students were eased in with a “take home” writing assignment that was discussed informally during class office hours, as all virtual lecture times were open for free form discussion. Surprisingly, class rapport carried over to virtual interactions, as evidenced by students’ comradery on the BlueJeans videoconferences and the platform’s “chat” feature: discussions were lively and respectful. Students debated and wrestled with ethical dilemmas in realtime similar to the pre-pandemic in-class discussions. This was underscored in the survey at the end of the first week of remote instruction (Table 1).

**Table 1. Virtual learning anonymous survey responses.**

|  |
|--|
| After first week of online instruction   |
| Please list the things the instructor did that helped you learn:<br>1) <i>Good discussion about the importance of Ethics in a work environment.</i><br>2) <i>Gave us a better understanding on how to look through a situation ethically</i>   |
| What actions taken by the teaching team did you find helpful:<br>1) <i>Online video/record of the course with PP [PowerPoint] support or handwritten document.</i><br>2) <i>The instructor set out the plan for the session so I knew what to expect.</i>  |
| Freeform comments<br>1) <i>There is no other substitute of classroom learning.</i><br>2) <i>Being present in the class is more fun and exciting.</i>   |
| Post class survey (18/23 respondents)  |
| 1) <i>“I think this class is a fantastic opportunity for people to develop their interpersonal skills. Even if we do not end up creating/joining startups, we still learn immensely from interviewing strangers, receiving unbiased data, customer discovery, etc.”</i><br>2) <i>“Unconventional teaching style and still get to learn a lot.”</i> |



In an effort to blend the advantages of asynchronous delivery with opportunities for interaction, we continued to conduct each class virtually in an office hours format allowing students to “drop-in” and “hang-out” during the BlueJeans videoconference. Each session was recorded, close captioned, and posted, within an hour to the Media Gallery (Kaltura, New York, NY). We quickly learned that very straightforward assignments, such as creating an intellectual property glossary for entrepreneurs (angel investor, prior art, venture capitalist) did not lead to sustained discussions during class videoconferences. Thus, we modified our assignments to have a pre-class component, such as readings and viewing pre-recorded content such as *Functioning Like a Startup Inside of a Big Business*, for our Intrapreneurship module. We purposefully designed questions to be open-ended and open to interpretation. This approach encouraged participation during the videoconference where students engaged in interpreting the question and discussing their individual perspective.

Returning to class rapport, with the move to a virtual setting, we heard from a number of our students that connections first-established in the classroom were further developed through our videoconferences. Students remarked that they appreciated seeing glimpses into their peers’ and instructors’ lives outside of the classroom, as our professional and personal worlds wholly collided. Students mentioned that, for example, seeing someone’s child enter a computer’s viewfinder or noticing how someone’s home is decorated, removed barriers and allowed for greater authenticity within the class. Moreover, on the final class virtual meeting, nearly the entire class participated. Even in a distributed world, with students spread across the globe, closure and good-byes were essential. When asked if students would recommend the course to other students, even with the move to virtual format, a 94.1% net promotor score<sup>1</sup> was reported.

### NEXT STEPS

Many universities face the imperfect decision of whether to open, offer a hybrid or blended option (a variable portion of in-person and virtual classrooms), or remain virtual for the upcoming term. Therefore, while our approaches to the customer discovery and evidence-based entrepreneurship methods used in this Tech Entrepreneurship course are unlikely to change in their core nature, they will need to be adapted to accommodate a world of virtual instruction. Prior to COVID-19, this course focused on in-person lectures and discussion to build community among student teams and instructors. We also heavily emphasized the need for customer discovery to be conducted in person. With

---

<sup>1</sup> In this context, the net promotor score serves as a proxy for student satisfaction. Its origins are in the private sector used to capture customer satisfaction (Bonbright et al. 2015).



## Transferring In-Class Rapport to a Virtual Classroom in a Technology Entrepreneurship Graduate Engineering Course

a change to remote delivery, we plan to address the gaps created through changes to the delivery of our instruction, performing customer discovery in an online capacity, and team building in a remote setting. One consistent thread is students' desire to maintain a connection with the instructors and each other. However, an important distinction for the path forward is designing the course to build rapport at the *onset* of virtual format vs. the *translation* necessitated by the COVID-19 pandemic. To support this, we look to evidence-based studies in online education. For example, Glazier conducted a study examining the impact of rapport building activities for an online introductory political course (Glazier 2016). Activities such as video updates, individual emails, and direct commenting on graded exercises were introduced into a portion of the classes (students, n=143) and not in others (students, n=322). The study revealed that rapport building resulted in higher grades and lower attrition. One key challenge to online education is course completion (Dutton et al. 2013) and consistent delivery of rapport-building interventions throughout the course is necessary.

In Table 2 we present a list of recommendations blended from our experiences and supported by learnings from scholarly work in rapport building and online education. We encourage our faculty colleagues to leverage existing survey instruments to measure instructor-student rapport (Wilson et al. 2010) as we plan to. Furthermore, we also recommend seeking out experts at your institutional teaching and learning center to design simple surveys—deployed early—and utilize instruments in online learning management systems as you work to improve delivery and student experience.

Ultimately, we see Technology Entrepreneurship taught in a blended format and optimistically we envision our approach is transferrable to in-person classrooms. By offering curated pre-recorded

**Table 2. Recommendations for establishing and maintain rapport in a virtual classroom.**

- 1) Initiating pre-class visits with students, or groups of students, prior to the start of the term. In larger classes, teaching assistants can be trained to conduct such sessions. These sessions may be in the form of a class orientation. For example, specific to the nature of Tech Entrepreneurship, students can be asked to reflect on times when they were in teams and achieved something meaningful. Such exercises may be done in small groups (virtual breakout rooms), and reported back to the larger group.
- 2) Setting clear course expectations, for both students and instructors.
- 3) Surveying students anonymously for continuous course improvement.
- 4) Demonstrating authenticity, empathy, and flexibility, i.e. acknowledging that some students prefer an in-class experience.
- 5) Acknowledging when assignments are out of students' comfort zones, and encouraging them to persevere in spite of their hesitations.
- 6) Facilitating small virtual sub-groups for the class to mimic small group settings and helping them schedule virtual meetings. Teaching students that demonstrating comfort during virtual meetings is a marketable skill for engineers. Thus, highlighting the skills that are transferrable to the workplace.
- 7) Adding comments to students' scholarly work directly in the learning management system, which the student sees immediately. In Canvas, this feature is accessed through the SpeedGrader tool enabling direct commenting as well as grading.
- 8) Allowing and encouraging tasteful humor and levity in the virtual classroom, from both students and instructors.
- 9) Arriving to the virtual classroom 5-minutes early and remaining 5-minutes after; thereby, displaying an openness and availability to students, and modeling an on-campus experience.



lectures as out-of-class learning opportunities, we would provide more room for content that is best delivered live (i.e. Team Formation, Design Thinking/Ideation Workshop, Customer Discovery Practice Sessions). Thus, affording instructors an opportunity to place their course along the delivery continuum that is most appropriate and impactful.

## ACKNOWLEDGEMENT

Thanks to Mary Fisher-Mullins for her recording of *Functioning Like a Startup Inside of a Big Business* (PowerPoint presentation) and to Leah Attruia for her tireless service as the Teaching Assistant. Partial support for this work was provided by the National Science Foundation's PFI-TT program under Award #1827321, and the National Science Foundation's I-CORPS NODE: I-CORPS SOUTH program under Award #1653289. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

## REFERENCES

- Altman, I. 1990. Conceptualizing "rapport." *Psychological Inquiry* (1): 294-323.
- Bernieri, Frank J. 1988. "Coordinated Movement and Rapport in Teacher-Student Interactions." *Journal of Nonverbal Behavior* 12(2): 120-138.
- Bonbright D., Lake B., Sahaf S., Rahman R., Ho R. 2015 "Net Promoter Score for the Nonprofit Sector: What We've Learned So Far" *Feedback Labs*. Accessed July 11, 2020. <http://feedbacklabs.org/blog/net-promoter-score-for-the-nonprofit-sector-what-weve-learned-so-far/>.
- Carey, J. C., Hamilton, D. L. & Shanklin, G. 1986. "Development of an Instrument to Measure Rapport Between College Roommates." *Journal of College Student Personnel* 27(3): 269-273.
- CREATE-X. 2020. "About CREATE-X." Accessed May 27. <https://create-x.gatech.edu/about>.
- Deeksha, T., Shri, C. & Vij, A. K. 2019. "Impact of Faculty Student Rapport on Classroom Environment." *Asian Journal of Interdisciplinary Research* 2(3): 46-55.
- Dutton, J., Dutton, M., and Perry J. 2001. "Do Online Students Perform as Well as Lecture Students?" *Journal of Engineering Education* 90(1): 131-136.
- Glazier, R. A. 2016, "Building Rapport to Improve Retention and Success in Online Classes." *Journal of Political Science Education* 12(4): 437-456.
- Huang-Saad, A. Y., Bodnar, C., & Carberry, A. 2020. "Entrepreneurship in Higher Education: A Research Review for Engineering Education Researchers." *Entrepreneurship Education and Pedagogy* 3(1): 4-13.
- Jarvis, R. 2019. "The Dropout." Accessed May 27. <https://abcaudio.com/podcasts/the-dropout/>.
- Wilson, J. H., Ryan, R. G. & Pugh, J. L. 2010. "Professor-Student Rapport Scale Predicts Student Outcomes." *Teaching of Psychology* 37(4): 246-251.



### AUTHORS



**Pamela Bhatti** is an Associate Professor and Associate Chair for Innovation and Entrepreneurship at the School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta. She is also the Editor-in-Chief of the *IEEE Journal of Translational Engineering in Health and Medicine*. Dedicated to instilling an entrepreneurial mindset, Pamela has coached over 50 student startup teams and over 30 clinical and translational researcher teams in the National Institutes of Health, I-Corps@NCATS program. In 2016 she co-founded a startup company based on her research in detecting wrong-patient errors in radiology, Camerad Technologies.



**Melissa Heffner** is the Program Manager for VentureLab, Georgia Institute of Technology, Atlanta. As an adjunct instructor for the National Science Foundation's Innovation Corps program, and a lead instructor for the I-Corps South Node, she has taught the lean methodology to over 200 startup teams. In 2016, Melissa developed and piloted a train-the-trainer program to coach university faculty and staff in the methodology, and to date has trained over 120 instructors.