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Training Engineering Students to Use Stories for Student Empowerment and Community-Building: The Re-Engineering Engineering Education Program at the USC School of Engineering

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Training Engineering Students to Use Stories for Student Empowerment and Community-Building:

The Re-Engineering Engineering Education (RE3) Program at the USC Viterbi School of Engineering

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The Collaborative Network for Engineering and Computing Diversity (CoNECD) Conference

January 24-27, 2021

USC Viterbi School of Engineering

AGENDA

1. The RE3 Program (20 minutes)
   - Purpose and Context
   - Research on Self-Affirmation and STEM Success
   - Research on Storytelling and Community Building
   - Implementation
   - Learning objectives
2. Sample RE3 Presentation Stories and Activities (5 minutes)
3. Impact and Assessment (5 minutes)
4. RE3 Student Trainer Story (5-7 minutes)
5. RE3 Student Trainer Story Debrief (5-10 minutes)
6. Questions (5 minutes)

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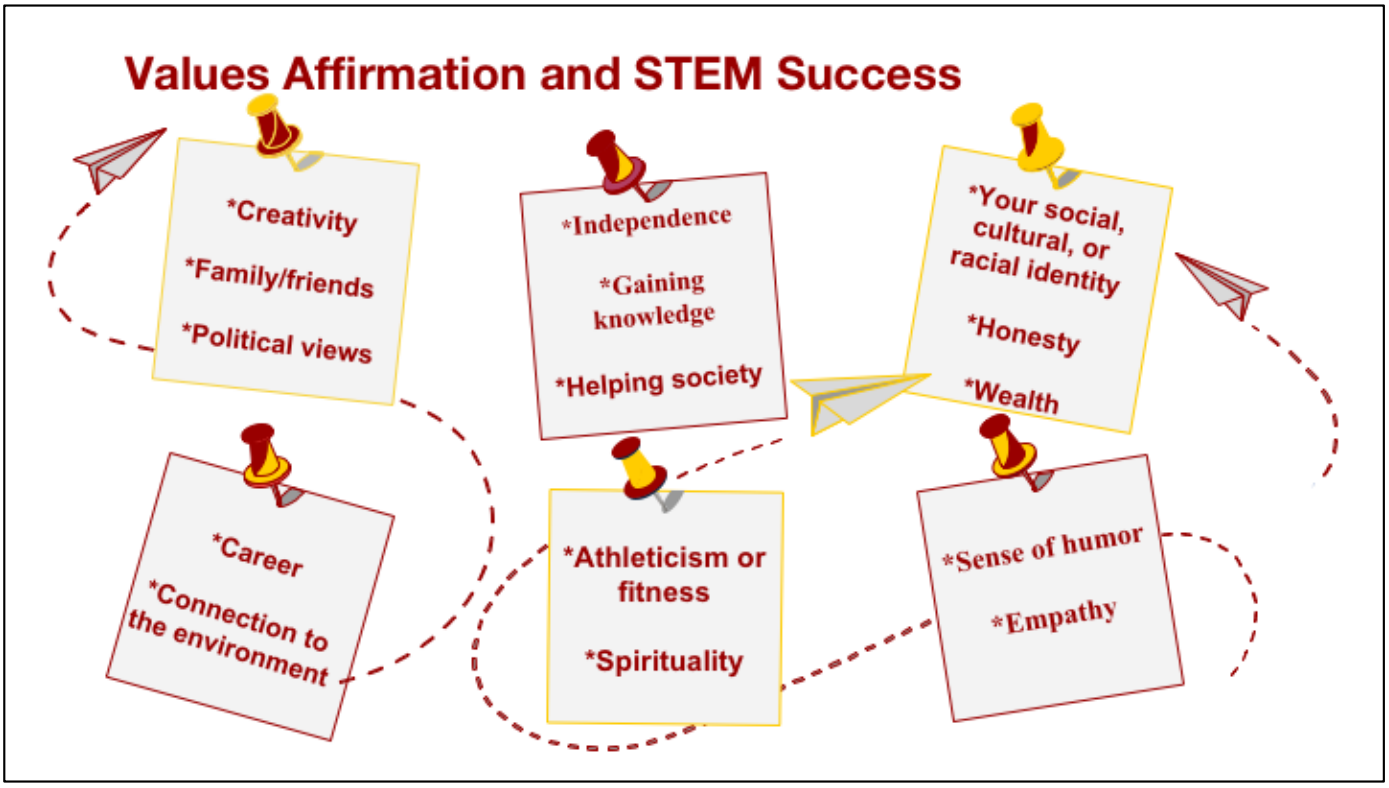
The RE3 Program - Purpose and Context

With the research about the roles of affirmation and storytelling in STEM success and community-building in mind, we created Re-Engineering Engineering Education (RE3) program in which undergraduate engineering students are hired and trained to share their personal stories of identity and educational development with first-year engineering students, faculty, and staff. These undergraduate storytellers - called Student Trainers - are placed in the position of teachers and storytelling is presented as part of an engineering educational experience. By teaching others about their experiences, students examine their own learning journeys, engage in the critical process of metacognition, and become stronger learners. This program is designed to show students that their voices matter and that students have the power to initiate change. And we pursued these goals because research shows that these outcomes are linked to fostering students' feelings of well-being and rootedness in the school community.

USC's engineering school includes about 2700 undergraduates and

5900 graduate students from across the globe. While its size and diversity are assets in most settings, students can sometimes feel disconnected and un-empowered. These feelings can be exacerbated for students from underrepresented backgrounds and in situations of heightened societal stress such as the pandemic. Thus, we felt that our students would benefit from a program that provided more personalized and human-centered opportunities where they could articulate their identities and core values and feel heard, seen, and valued by the school community.

RE3 was launched as a one-year pilot program with funding from the Office of the Dean at the USC Viterbi School of Engineering and a $25,000 mini-grant from the Coalition for Life-Transformative Education (CLTE). CLTE is a consortium of university leaders interested in exploring ways to provide college students with a transformative educational experience that addresses their well-being and promotes their understanding of their life's purpose. The vast majority of the CLTE mini-grant was spent on Student Trainers' stipends and materials.



The RE3 Program is grounded upon the research relating to values affirmation and STEM success. Over the past decade, researchers have shown that when STEM college students who feel at risk of upholding stereotypes or being judged based on stereotypes (students of color, women, first-gen students) engage with values affirmation in a STEM environment, their performance can improve as they seem to be able to protect themselves to some degree due to a boost in their self-worth. An example of a values affirmation exercise is a simple 15-minute writing activity where students think about themselves and their values, In this activity, students are asked to select 2 or 3 values (such as those noted above) that are most important to them and then write why these are important to them.

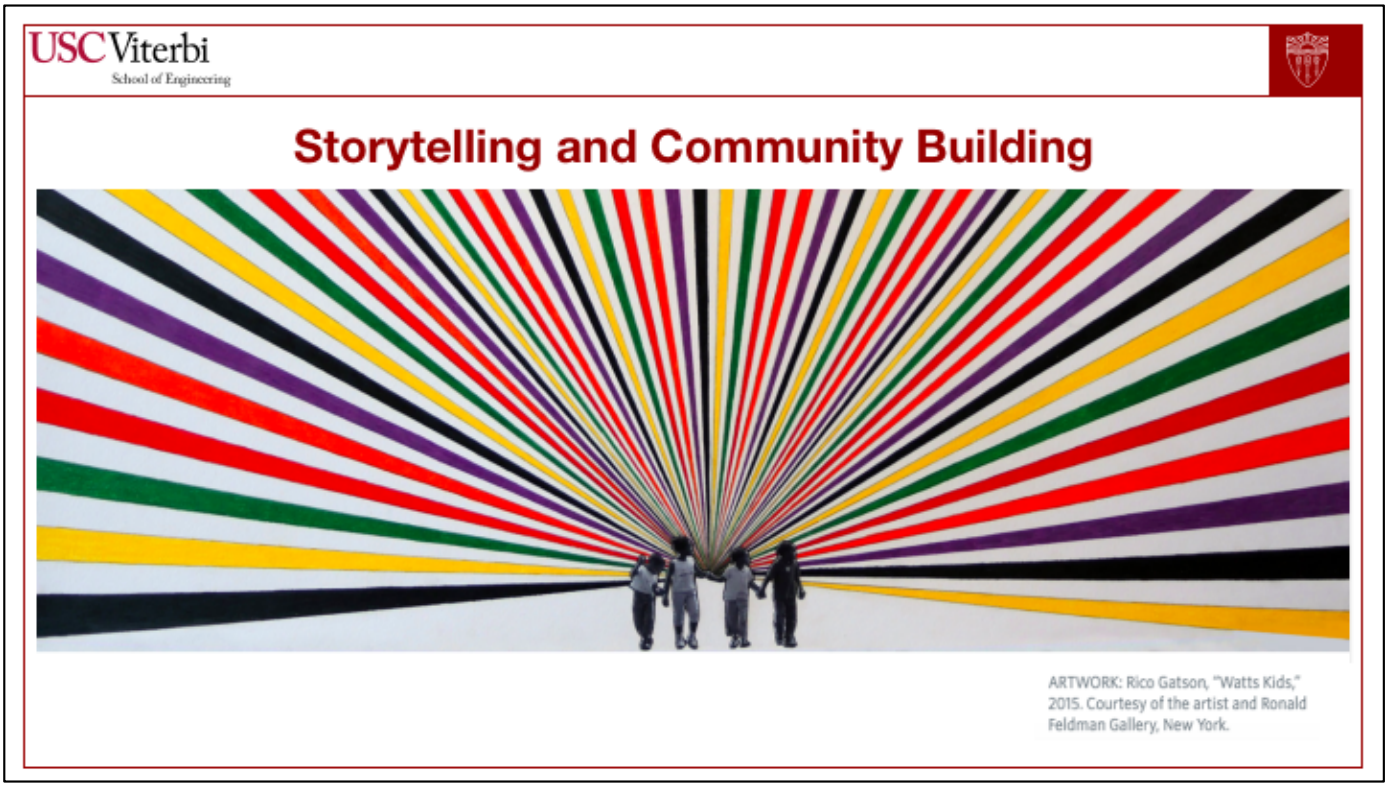
This enhanced self-worth manifests itself in improved course performance in STEM courses in terms of increased test scores, course grades, and even overall GPA. In addition, those who engage in values affirmation seem to be more likely to sign up for the next course in the STEM sequence - which relates to retention within STEM majors. This result has been shown to be effective in varying degrees for women, first generation students, and students of color.

And more recently, researchers at Columbia University found students in biology “weeder” courses who participated in values affirmation exercises also enhanced their social networks and a sense of belonging - as such students are more likely to have more friends in the course.

You can see here 15 values that researchers have been using - and interestingly, most are unrelated to academic achievement. This non-academic focus of values help boost self-esteem and some researchers hypothesize that focusing on these values work because these non-academic values affirmatively direct attention away from the academic threat.

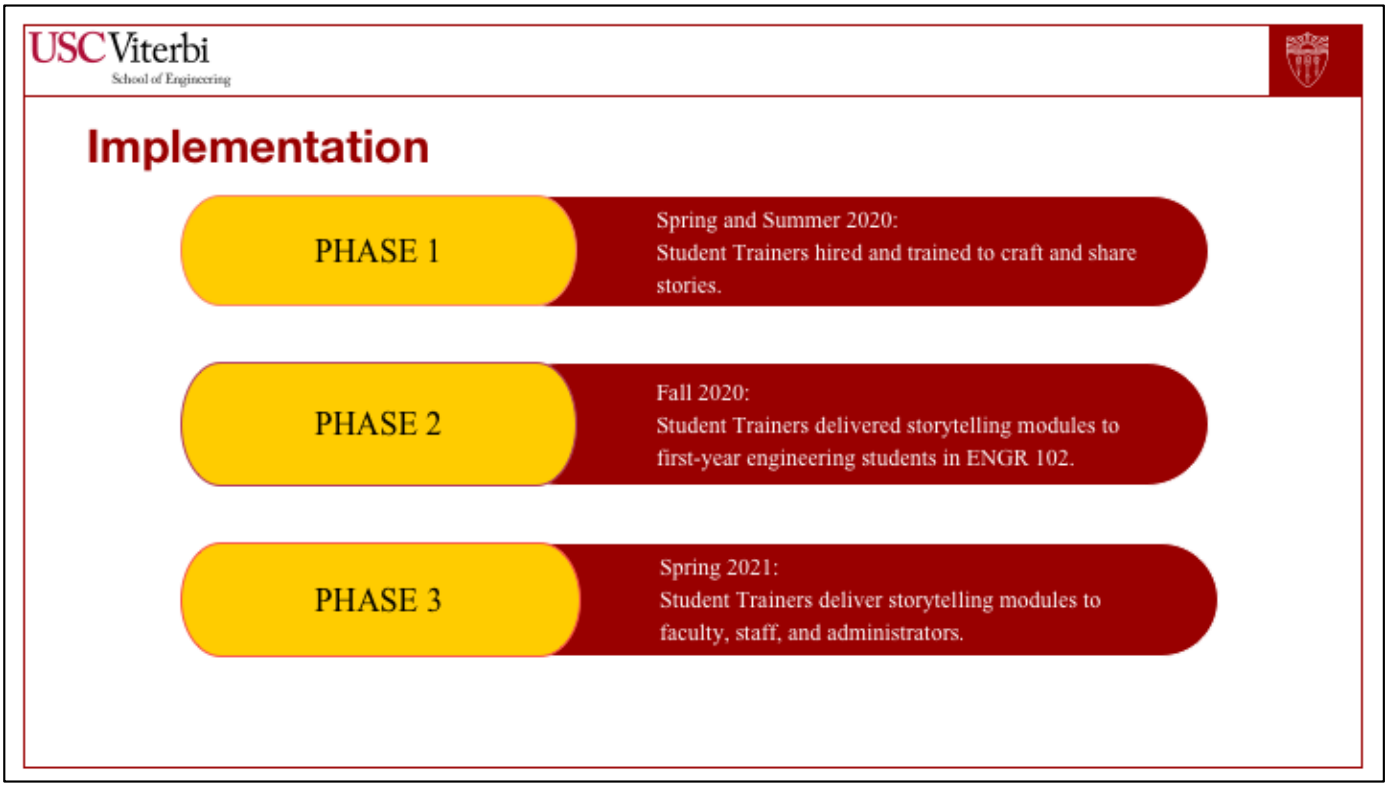
And also interestingly - STEM students who engage in values affirmation seem to benefit from a recursive effect, whereby the impacts sometimes last even after the intervention in a specific course, and students are able to self-initiate this process going forward in times of stress.

So in light of this research, we tried to think of a student-centered way to take values affirmation to another level - where students are encouraged to think about themselves AND share information about themselves and their core values within the engineering space.



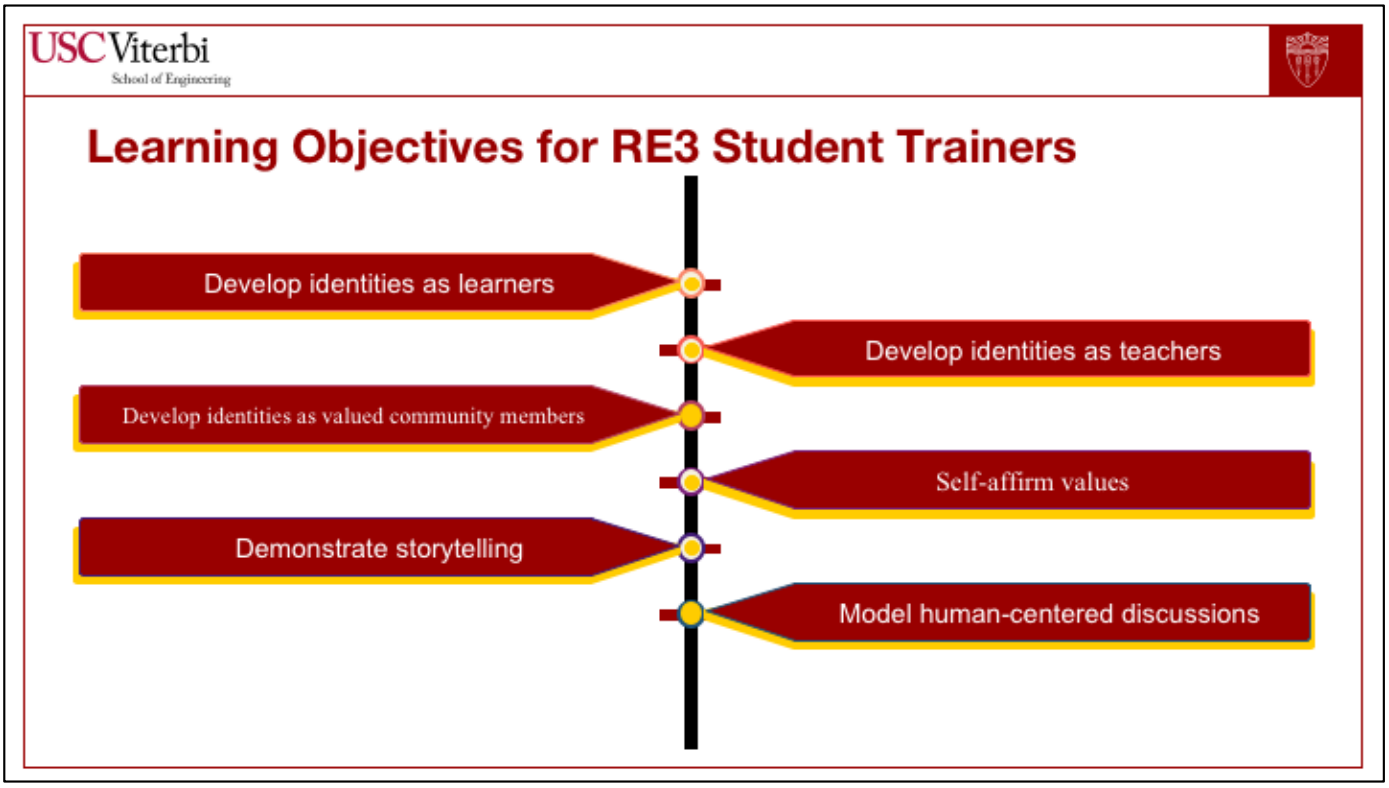
Storytelling was chosen as the medium through which to empower students as they explore their identities and affirm their values -- because doing so centers our students' narrative capital. These are their stories to own and tell - and they are the experts when it comes to themselves and their values - not professors. By teaching others about themselves and sharing their values, they take an active part in the enterprise of learning - this time in the role of teacher. And we know from research that when the community gathers to share student stories and highlight their voices, participants send a clear signal to each other and the campus community that human-centered experiences and connections are critical to building community bonds.

Research also suggests that story sharing can influence not just the way people think about their world and their places in them, but can also build trust, cultivate community norms, and generate emotional connections. Why is this important in engineering classrooms? This social network may play a role in STEM retention for all students. Researchers found that students who had more friends in a STEM class were more likely to take the next course in the sequence - regardless of race or gender and made more friends in the class. Thus, when storytelling is combined with personal self-affirmation of values - we felt that this could be a powerful tool for engineering students - both socially and academically.

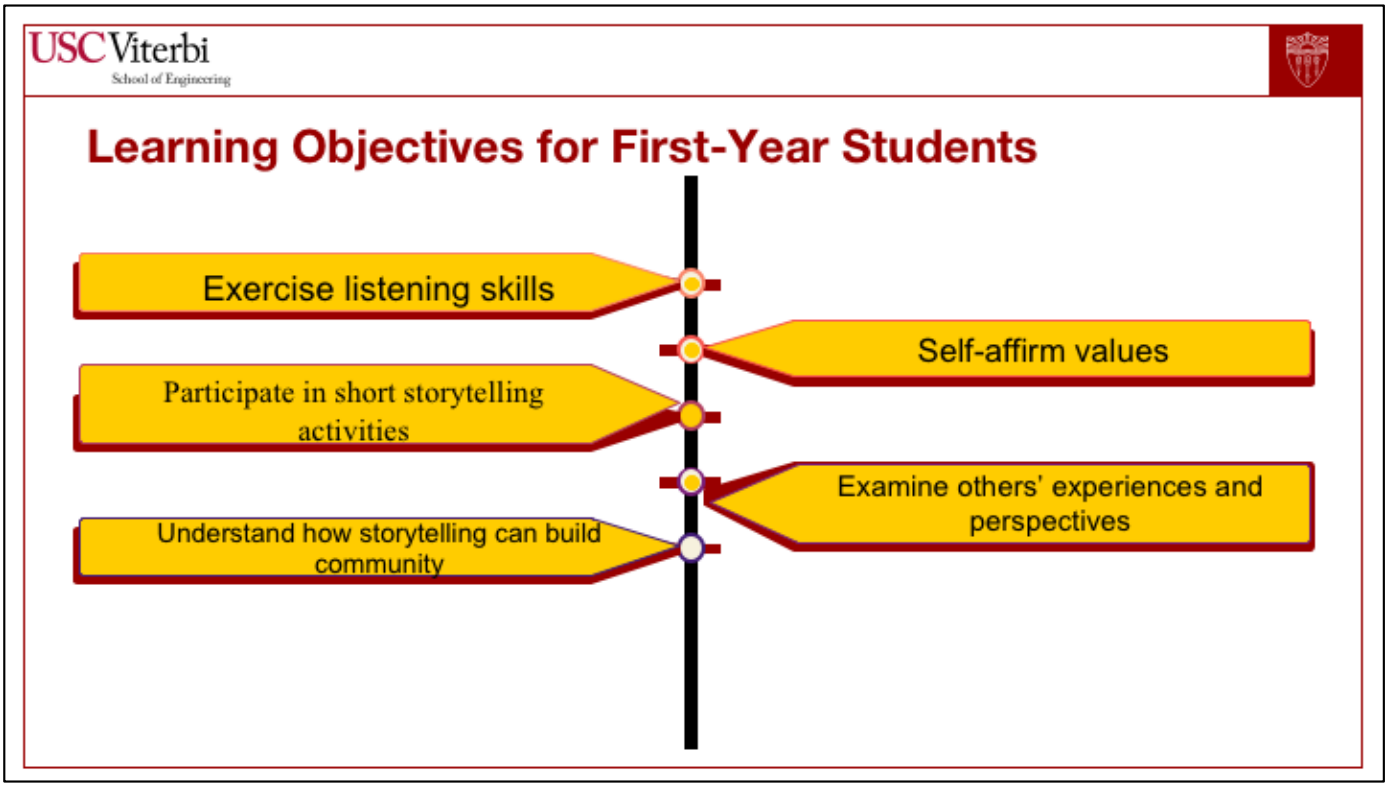


We designed the RE3 program to reach the community in three phases. In Phase 1, which occurred during Spring and Summer of 2020, we hired ten undergraduate engineering students to be RE3 Student Trainers and trained them over the summer to teach and tell stories over the course of 3 faculty-guided retreats. During the summer, we learned about each other through stories, examined many different types of stories and storytelling, and learned about active learning and how this pedagogy can be used to enhance engagement in an engineering classroom. In addition to attending trainings, students had to complete assignments designed to help them craft their personal stories as well as lesson plans for Phase 2. In Phase 2 (Fall 2020), RE3 Student Trainers taught a storytelling module to over 300 first-year engineering students enrolled in a course called ENGR 102: Freshman Academy. In this storytelling module, Student Trainers taught first-year students about storytelling, shared their personal stories, and guided first-year students in storytelling activities designed to help students share short stories about themselves. In Phase 3 (Spring 2021), Student Trainers will expand their teaching to include other members of the engineering school community - such as faculty, staff, and administrators. This group of faculty, staff and administrators will be carefully selected in order to address imbalances in power and to ensure that Student Trainers feel empowered after the experience. We do not want to put student trainers in a position of vulnerability and defensiveness - as that would be counter-productive to the program's goals. The first group that we will be presenting to in the spring will be the engineering school's student advising team. These are the professionals in Viterbi's student affairs office who meet with students one-on-one to discuss their academic pathways, and this

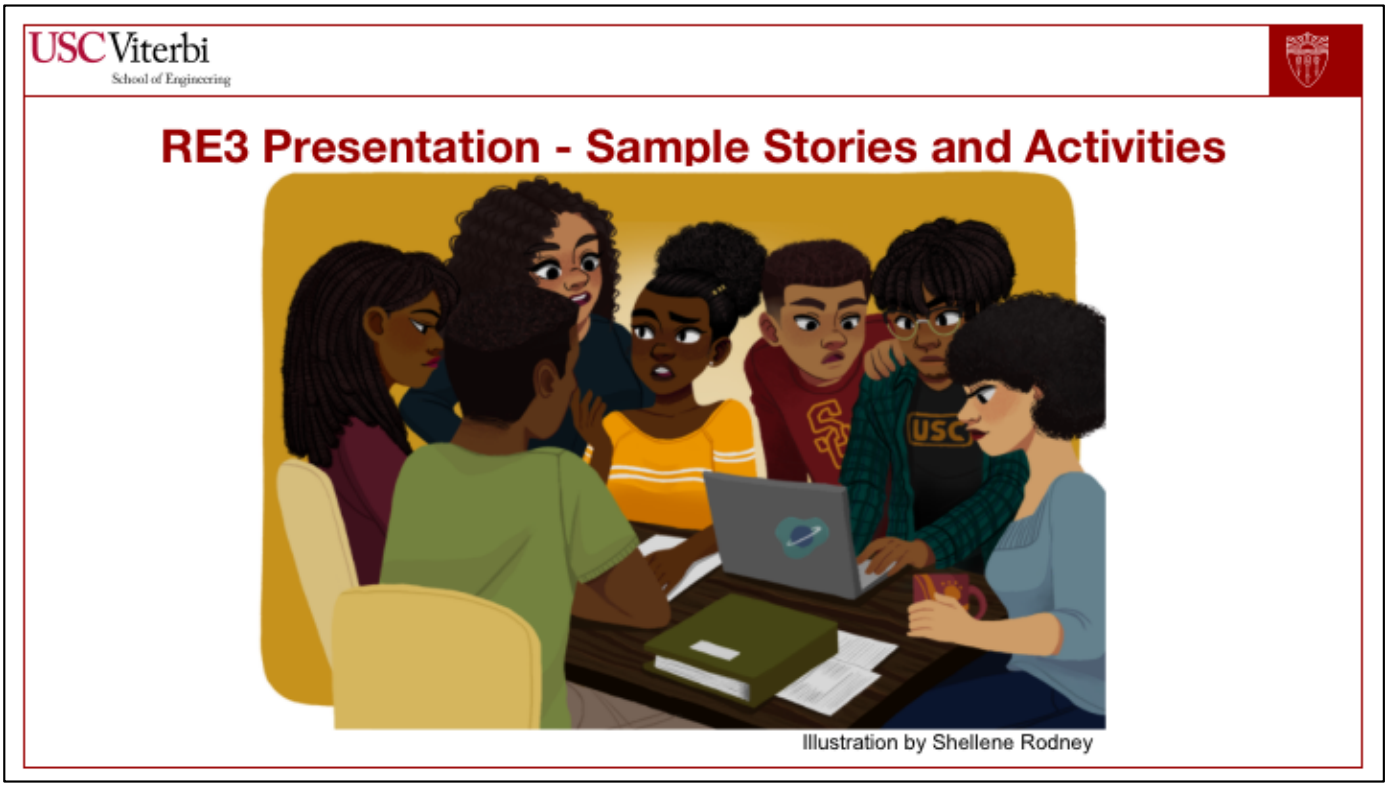
group reached out to us because they wanted to learn more about students in order to improve their ability to serve our students.



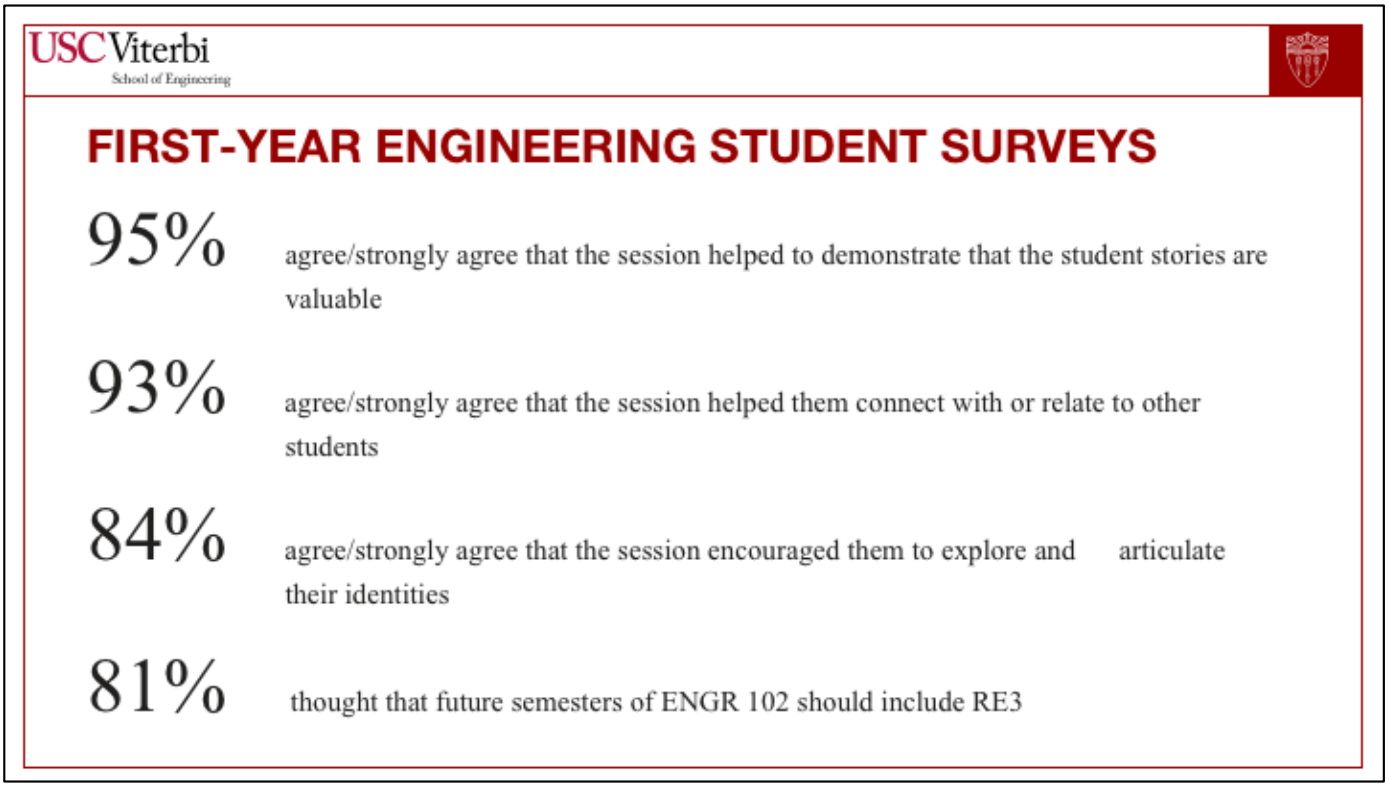
As both an extracurricular program and curricular program, RE3 has separate learning objectives for Student Trainers and first-year students. For Student Trainers, learning objectives include: developing their identities as learners, teachers, and valued members of the community, self-affirming personal values through reflecting on their experiences when developing their stories, demonstrating storytelling, and modeling human-centered discussions in engineering settings. Through the trainings, which provide a sustained examination of their identities and opportunities to reflect in preparation for teaching others, Student Trainers strive to enhance their feelings of purpose, agency, and community with others. They learn that their roles in these jobs have great purpose and value, and that as peer educators - they can reach others in a way that instructors cannot. And they learn that their willingness to take risks and be vulnerable can have powerful consequences in building connections with others.



For these first-year students, who are receiving this storytelling module as part of their introduction to engineering curriculum, learning outcomes include exercising listening skills, participating in short storytelling activities through which they can begin to examine their values and identities, examining various experiences and perspectives, and understanding how storytelling can build a sense of community. For these first-year students, they are experiencing this 60-minute program as part of their ENGR 102 course - early in their college careers during a time when many crave community-building. When we devised this program in 2019, we saw a need to build more community at our school - and little did we know that this need would be even more of a priority just a few months later.



An RE3 presentation to first-year engineering students in ENGR 102 consists of about 60 minutes of story-related activities and story sharing. The content for the presentation was developed over the summer collaboratively among student trainers and faculty; a template for a presentation with activities, timing, and teaching tips was then developed and trainers used that to make their own presentations. A sample presentation includes a story-based icebreaker such as the Name Story, where first year students are encouraged to share stories about the origins of their names. A short discussion about why storytelling is important for engineers follows, along with a discussion about storytelling norms and how people will share and receive stories. That is then followed by the student trainer sharing their personal story and a debrief - during which time, first-year students share their reflections on the story that they just heard. First-year students then participate in another activity in small groups where they share a bit more in an activity called “Just by looking at me…” Following another debrief, students then participate in a collaborative story. This semester, the collaborative story involved students finishing this sentence, “In the next 4 years, I will…” With each activity, students share a bit about where they come from, elements of their identity that may be invisible, and their hopes for the future. For our initial cohort, RE3 Student Trainers shared stories about racial identities, international student experiences, personal growth, mental health struggles, familial strife, and searching for purpose. These themes overlap with some of the values that researchers used in their studies about value affirmation that we discussed at the start of this presentation.



We were nervous about how the storytelling module would be received - so we gave the first-year engineering students a survey, and you can see from the results of a survey that I'm sharing with you that 95% agreed/strongly agreed that the session helped to demonstrate that student stories are valuable. This was something that was a high priority for us - we wanted to demonstrate to students that they could bring all of themselves into the engineering space and that their values and identities matter.

93% agreed/strongly agreed that the session helped them connect with or relate to other students. Our Student Trainers achieved this by making to sure to have low-stakes activities where it would be easy to participate and share. Their activities included participating in the Zoom chat, small groups, and large group activities. And we know that this issue of making friends - was especially important for first-year students this year as this is the group that graduated from high school online and started college online.

84% agreed/strongly agreed that the session encouraged them to explore and articulate their identities; and 81% thought that it should continue in future iterations of the course. Clearly, storytelling is something that resonated - and in particular we received many comments where students expressed relief that not only was it okay to feel vulnerable but also that it was okay to express them in an engineering space.

As we are now a bit past the halfway mark with RE3, we asked the Student Trainers for their feedback on the program. We asked them what they learned from their participation so far - and without exception, they remarked on the value of reflection on their experiences. You can see some of their feedback here. And while there is some overlap in learning outcomes between the first-year group and the RE3 Student Trainer group, the results from the first-year survey suggest that after RE3, community-building and learning about others were the main takeaways for most first-year students. In contrast, RE3 Student Trainers' survey results and feedback suggest that their experience in RE3 helped them to learn more about themselves. These results may reflect their distinct positions within the storytelling relationship, as RE3 Student Trainers must engage in sustained reflective processes in order to develop their personal stories and storytelling modules.

Next, I want to share with you a one of those RE3 stories. Our storyteller today is Cheyenne Gaima - she's a RE3 Student Trainer and is a USC Viterbi student in Computer Science and Business Administration. She is not only a gifted writer and activist, but she is also President of USC's National Society of Black Engineers. Her story will be followed by a debrief that she will lead. We will give Cheyenne the last word today, and after her story and story debrief, please feel free to ask any questions.

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RE3 Student Trainer's Story

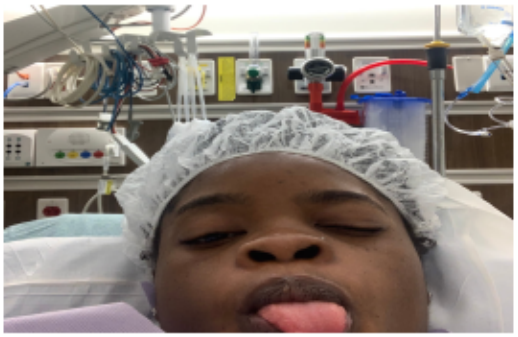
How I Became a Runner

Cheyenne Gaima

Volunteer Park, Seattle, WA

Skydiving!

Pushing Through!



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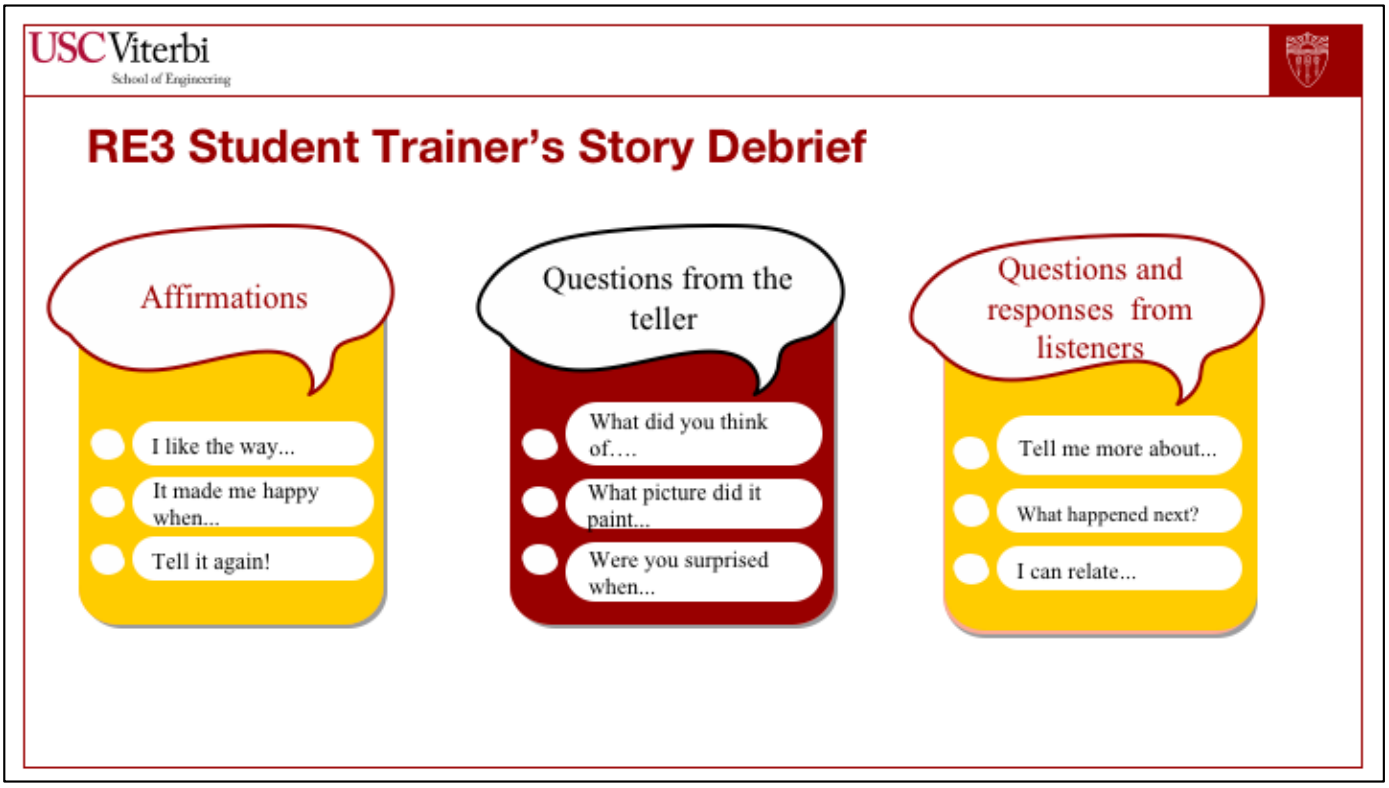

In an RE3 presentation, one of most important parts is the "debrief" after the Student Trainer presents their personal story. The debrief begins with affirmations for the storyteller, and the teller then asks questions to listeners. That is followed by questions from listeners.

This debriefing procedure is not only an important part of learning and metacognition, it is part of the classroom culture that we are striving to build - a culture of listening and reflection so that students feel that they can take risks and share with others.

[We will then invite the audience to debrief the RE3 Student Trainer's story - the student storyteller will lead this section]

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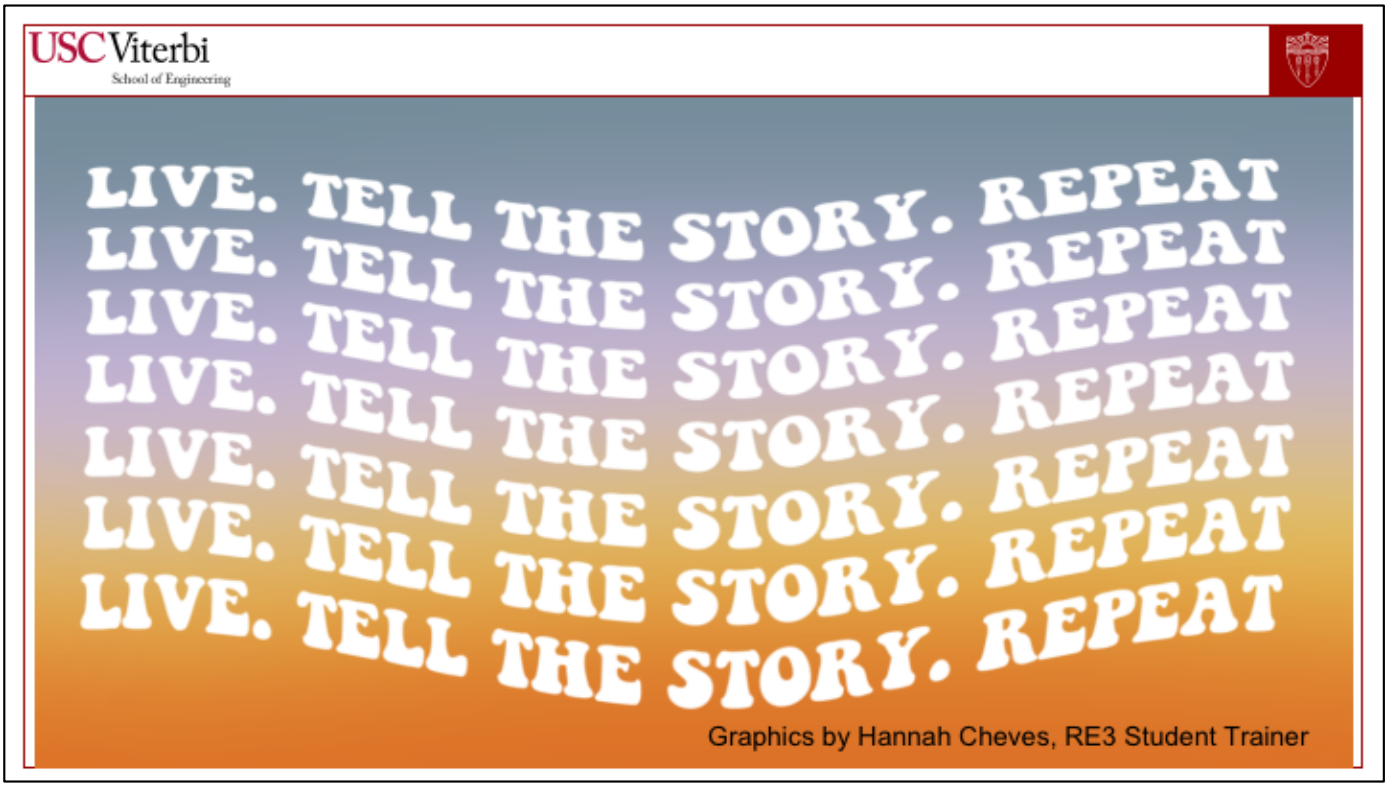
QUESTIONS

Image: National Museum of African American History and Culture

Questions from attendees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LIVE. TELL THE STORY. REPEAT
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Graphics by Hannah Cheves, RE3 Student Trainer

Thank you!

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