



The Global Student Forum: A model for developing student leaders in engineering education

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In May 2016 I will be graduating with my B.S. in Biomedical Engineering from the University of Southern California. I had the chance to participate in a flipped, international classroom during my studies, which led me to attend the 10th Global Student Forum in Dubai, UAE. I recently served as the Activities Chair for the 11th Global Student Forum in Florence, Italy, and I currently serve as the SPEED (Student Platform for Engineering Education Development) president in the US. I wrote this paper in collaboration with my international colleagues and we look forward to the opportunity to present our findings at the upcoming ASEE conference.

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I was born 17th January 1991 in Offenbach, Germany and graduated High school 2010 at Gymnasium Michelstadt, Germany. After that I presented a social service for one year with the German Red Cross as a paramedic, from 2010 to 2011 and continued working there parallelly to my studies. I started a B.Sc. Environmental Engineering at TU Darmstadt, Germany in 2011. From 2013-2014 I realized a year of studies abroad at the university "Escuela Colombiana de Ingeniería Julio Garavito" in Bogota, Colombia. A year later I did an internship on micro hydro power in rural regions of Central America in León, Nicaragua, 2015, which is part of the area I am focussing on in my studies. I served as Relations Officer 2013-2014, International Chair 2014-2015 and Vice President for Member Relations 2015-2016 at SPEED (Student Platform for Engineering Education Development). I am now aspiring my graduation as B.Sc. in July, 2016 and after that a Master of Science in the area of water resource management and environment.

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Rohit Kandakatla has completed his B.Tech in Electronics and Communication Engineering from Manipal University, India and is completed his masters in Embedded Systems from Jawaharlal Nehru Technological University, India. He has been closely associated with the Student Platform for Engineering Education Development (SPEED) since 2012 and is currently serving as the President of the organisation. His work with SPEED since the past 3 years is focused on engaging students in engineering education discussions across the globe. He founded the Indian Student Forum (ISF) which is a regional replica of the Global Student Forum to provide a platform for more students to start engineering education initiatives. Rohit is also the founder and CEO of Footsteps, a social venture which is working towards transforming engineering education in India through faculty and student workshops. As an IFEEES executive member he intends towards the IFEEES student strategic thrust and engage more students into the engineering education community with new collaborations and initiatives.

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Introduction

The Global Student Forum (GSF) is a three-day event organized by the Student Platform for Engineering Education Development (SPEED).¹ Students come to GSF from all over the world to participate in a series of workshops, discussions, and presentations, culminating in the creation of action plans. The chief aim of these projects is to enable students to become a factor of change in the development of engineering education (EE). This event is subsequently followed by the annual congress of WEEF (World Engineering Education Forum), which is organized by IFEES (International Federation of Engineering Education Societies) and other partner organizations. Apart from the GSF, our principal event, we organize forums on national levels, such as the Indian Student Forum (ISF) or the Argentinian Student Forum (ASF), as well as regional workshops on an annual or provisional basis.

The goal behind our work as a students' organization is to connect like-minded people and student leaders who are eager to implement changes to their EE environment. These students may also be interested in sharing opinions and co-constructing knowledge with other students from around the world, as well as connecting to leading professionals in the field of EE. Participation in our organization may spur ideas for personal, social and/or school-related projects. The events we organize are about developing creativity in problem solving and networking. SPEED motivates students to work in interdisciplinary and intercultural groups and to think outside of the box while amplifying their vision of possible solutions to EE problems.²

The aim of the GSF is to collect opinions and ideas from the global student community regarding EE on a regional, national, and international level. The first GSF was held during the 5th ASEE Global Colloquium on EE in Rio De Janeiro, Brazil. Since then 11 themed GSFs have been organized in a diverse set of host countries³ (Table 1).

Table 1: Complete History of GSF Locations. Eleven forums have been hosted since 2006.

	Year	Location		Year	Location
1st GSF	2006	Rio De Janeiro, Brazil	7th GSF	2010	Singapore
2nd GSF	2007	Istanbul, Turkey	8th GSF	2012	Buenos Aires, Argentina
3rd GSF	2008	Cape Town, South Africa	9th GSF	2013	Cartagena, Colombia
4th GSF	2008	Bhubaneswar, India	10th GSF	2014	Dubai, U.A.E
5th GSF	2009	St. Petersburg, Russia	11th GSF	2015	Florence, Italy
6th GSF	2009	Budapest, Hungary			

The GSF Model

For the organization of our GSF we have developed a model that has proven itself of value over the past years. The organizing team of every GSF normally consists of two groups, a local and an international team. Each team is guided and supervised by a local or an international chair. For

our 11th GSF in Florence, which is used as a representative sample of our work in the present paper, we had three international chairs and two local chairs. We used a basic team structure that has grown over the years and we are still adopting changes to this set-up. There are organizing groups for Logistics, Scheduling, Educational Content, Social Media Promotion, Relations, Graphic Design, and Activities. These groups fall under the international team. The local team depends on the availability of students onsite. These students are typically familiar with the host city and venue, provide relevant insights, and are interested in assuming the role of an organizer.

The local team receives support from the international team regarding mainly educational content and promotional work. In turn, the international team receives important inputs from the local team about local difficulties or challenges in the planning process. The local team makes decisions about venues and scheduling priorities in addition to providing information about budgets, searching for local sponsors and community service events, etc. All teams work collaboratively and in support of each other. During the preparations for the 11th GSF, we encountered the issue of finding very few Italian students who could help us in organizing our forum. Nevertheless, we managed to cover all needs and tasks between the two teams, so the event was successful in creating new connections and developing our professional network. We had great results from working with an official team for the area of Graphic Design this session, which helped us to create more professional looking information and promotion material. We also had a great experience in sharing and collaborating with partners from BEST, which is a students' organization in Europe with similar goals, but a different concept. While SPEED tries to create primarily international connections, BEST focuses on a European network.

The planning committee for the 11th GSF consisted of 36 people on the international team and 5 people on the local team, including 2 local and 3 international chairs. Our executive committee consisted of 7 people. Basic milestones in preparation of the event were: the establishment of our budget and registration fee, recruitment of participants, and identification of sponsors. Additionally, we worked on the overall schedule, activities setup, identifying technical visits, and searching for mentors. The final phase of preparation dealt with settling issues such as making welcome packets, designing t-shirts, and providing necessary VISA information to all the participants.

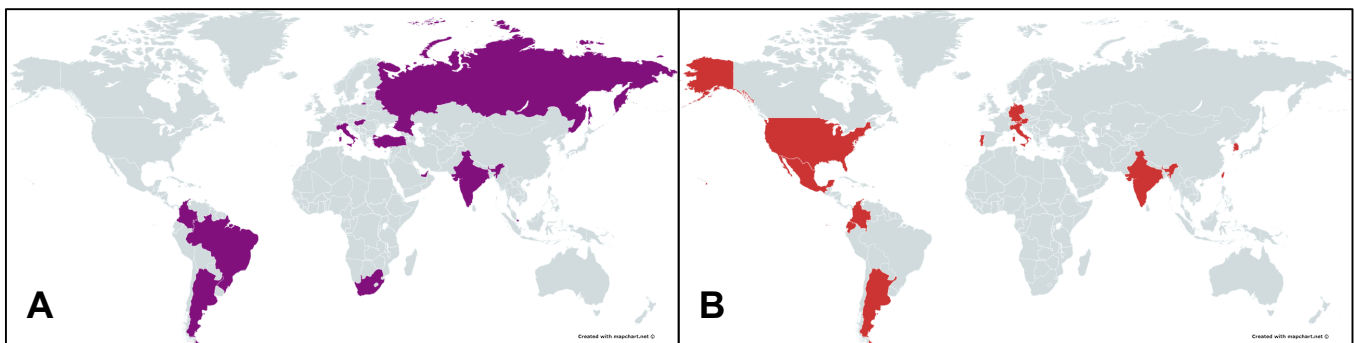


Figure 1: GSF Maps. (A) History of GSF Locations. (B) 11th GSF Student Demographics. Students attended the forum from 12 countries, including: Argentina, Austria, Colombia, Ecuador, Germany, India, Italy, South Korea, Mexico, Portugal, Taiwan, and the USA. Images were generated with mapchart.net.

Participant recruitment was mainly conducted by our Relations team, which contacted universities that had sent students to our events in years past and also searched for new university contacts. We also connected with participants of other EE-related competitions and award winning teams, which may receive sponsorship to participate in the GSF. This happened for example with members of IGIP, which is an Austrian society on EE. We also invited students who are going to be part of the local organizing committee for the upcoming 12th GSF in Seoul, South Korea in November 2016. This provides the incoming students with exposure to our model before they implement their own event.

Almost all of the students who attend our forum receive sponsorship from their universities or the organizers of EE-related competitions in their home countries. We also invite students who are exceptionally motivated to give back from the experience that they gained in attending prior student forums. These individuals join our events as mentors to guide the groups of students on their projects. SPEED or the students' universities typically sponsor these mentors.

We normally decide on three tracks for every GSF, which have a narrower focus than the overarching forum's theme. In 2015, we worked with the umbrella theme "EE for Multi-Faceted Engineers," which encompassed three tracks: "Entrepreneurship in EE" (Track 1), "STE'A'M – Arts in EE" (Track 2), and "Resilience in EE" (Track 3). The number of participants varies slightly from year to year, but we typically expect around 80 to 100 students. Within each track students are further divided into even smaller groups (i.e. 5 students). These groups aim to innovate a solution to an EE problem related to their track's theme. This solution should be well-developed having used the Action Planning technique that we teach the students. Another key aspect of the projects is that they should be community-centered. We want students to be active participants of their community and their projects should have the potential to be implemented in their home countries.

Schedule and Major Events. The usual schedule of a GSF consists of the following steps:

- Having a welcome event and ice-breaking session with all of the participants
- Having a keynote speech and international experts in EE conduct a small workshop
- Hosting informative speeches about Educational Content of our event and the methods we want to use
- Forming groups of students in every track (students are assigned to tracks after ranking their preferences online) to brainstorm ideas for possible projects
- Allowing students to choose their project of choice and assigning revised groups
- Guiding student groups through the process of defining resources, methods, goals and milestones for their projects
- Allowing students from different tracks to give feedback to each other
- Having project presentations
- Allowing judges to select final winning teams based on presentations
- Inviting students to keep working on their Action Plans and guide their process post-GSF

Other parts of our events include:

- Cultural night (an opportunity to exchange traditions, music, food & beverage, etc.)
- A community service project
- Technical visits regarding track topics
- Networking dinners with professionals from the field of EE

Method for Collecting Student Feedback

In 2015 we conducted a two-part survey in order to collect feedback regarding the 11th GSF. For the pre-GSF survey we are using feedback from Track 2 participants as a sample representation of all GSF participants. Students were asked about their general experience with working in intercultural and interdisciplinary groups, as well as their perspectives concerning their own EE experiences. The students were asked to choose their typical response when encountering a problem in EE. We also tried to identify what is hindering students from being more proactive in their EE environment. Towards the end of the forum, surveys were handed out again to students from various tracks in order to make a before-after comparison regarding the measurable impact of our event on the participating students. The subsequent sections will focus on the data and analysis that resulted from the survey.

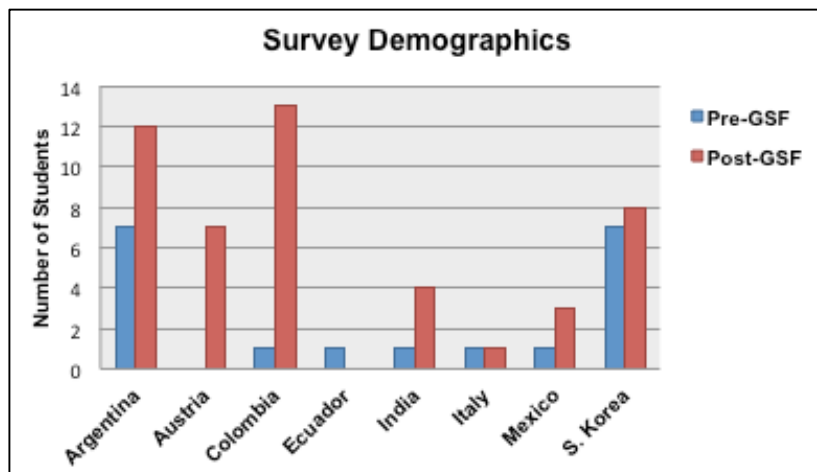


Figure 2: Survey Demographics. The pre- and post-GSF surveys were answered by 19 and 48 students, respectively. Note: in the following sections the number of responses may vary from these numbers due to indirectness or the lack of clarity in a response, omission of response, or in some cases students opting to provide more than one response.

Results

A sample of students completed pre- and post-GSF surveys to compare their EE opinions before and after the GSF. For both surveys the participants completed the questions during the forum using hard copy questionnaires. Survey demographics can be seen in Figure 2 above. Both English and Spanish versions of the survey were provided to accommodate the many Native Spanish speakers at the forum.

Pre-GSF Survey. The pre-GSF survey asked a total of eight questions, and it was conducted on the first day of the forum (results shown in Figure 3). Interestingly, almost one-third of the students (6 out of 19) replied that they faced difficulties regarding cultural barriers while working with other people during the first activities of the forum. On the other hand, almost two-thirds of the students (12 out of 19) reported that the ice breaking sessions were beneficial for getting students out of their comfort zone and able to open up to other students. Almost all students (17 out of 18) thought that activities with people from different countries would be

beneficial to them by helping them to move beyond their cultural barriers. About two-thirds of the students (13 out of 19) said that they had experienced some problems with EE at their schools or universities. When asked what they do when they encounter these issues, about half of the students (10 out of 18) responded that they work with the university, almost one-third of students reported that they take the initiative themselves, and one-ninth of them (2 out of 18) said they don't address them. When asked if the students discuss with others about the problems that they face in their EE, only 11 out of 19 responded that they do. Surprisingly, when asked if they also think about solutions for the problems that they face in their EE, every student (19 out of 19) said that they do. The most interesting question was about what is hindering the students from being more proactive in changing their EE. Here some students selected multiple answers, but not a single student said that there was "no hindrance" (although the Spanish version of the survey lacked this option). The most popular answers were being "unsure of how to start" (8 responses), "university policies" (7 responses) and "lack of support" (5 responses).

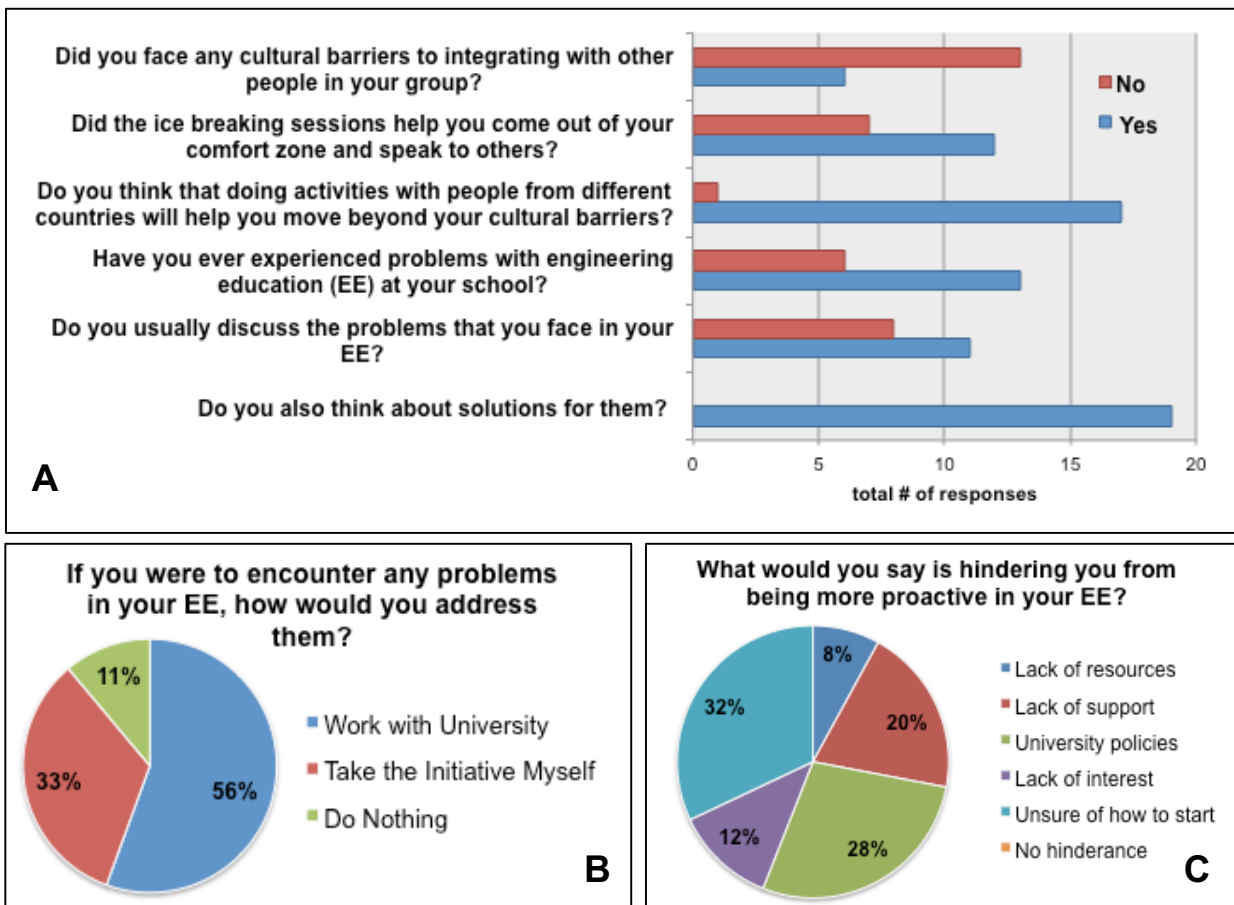


Figure 3: Pre-GSF Survey Results.

Post-GSF Survey. Results for seven of the questions from the post-GSF survey appear in Figure 4. Almost all of the students (44 out of 48) reported that working in interdisciplinary and intercultural groups helped them to develop an appreciation for diversity in teams. Additionally, almost all of the students (47 out of 48) answered that the GSF was helpful in developing ways

for them to overcome cultural or language barriers. As a result of the GSF most students (45 out of 48) reported that EE seemed more relevant to them. A majority of the students (38 out of 48) said that they found topics that they want to engage within EE. When asked how they would address their EE problems from now on, all students responded that they would take some form of action to address these problems. There were a total of 27 students who said that they would work with the university, and 24 who said that they would take the initiative themselves (notice that some students recorded more than one answer). Another important question asked whether the students would use Action Planning, a technique learned during the GSF, as a problem-solving method in the future. The vast majority (42 out of 46) responded that they would, 4 students responded no, and 2 students didn't directly answer with one of the provided options. The last question asked how the students would rate the effectiveness of Action Planning as a problem-solving method. Most of the students rated Action Planning with a 6 or higher (41 out of 47 students). The three most notable answers were the ratings of 8 (18 responses), 9 (11 responses), and 7 (7 responses).

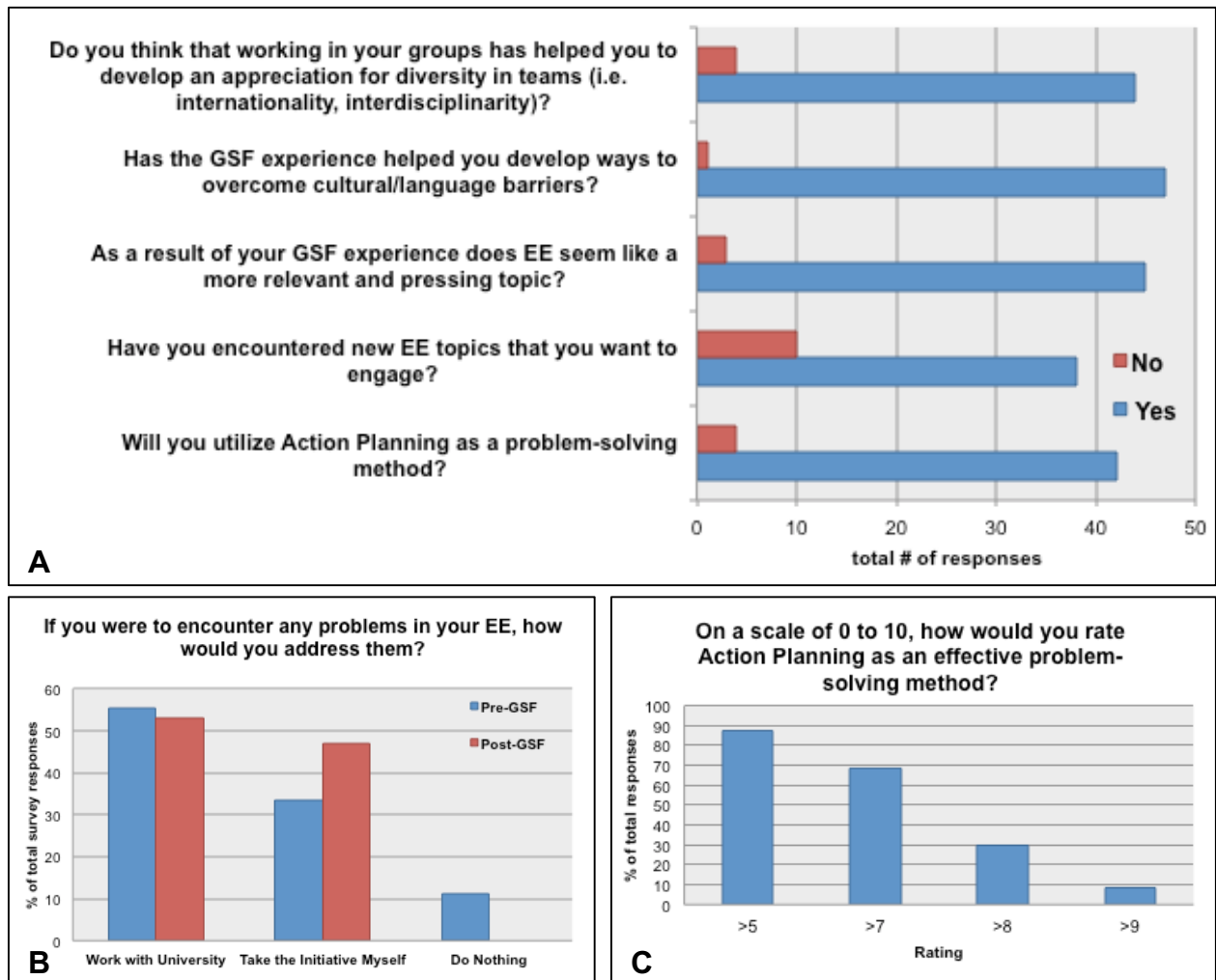


Figure 4: Post-GSF Survey Results.

Discussion and Analysis

Pre-GSF Analysis. The fact that there is room to improve EE—the underlying philosophy of SPEED and GSF—was voiced by our program participants, with 68.4% of students reporting that they had previously experienced problems with EE at their resident school when entering the forum (Fig 3A). But while a majority of students agree that their EE suffers from such problems students had diverse opinions on how they would respond to their EE issues. Most students—55.6%—said that they would work with their university while 33.3% said that they would take initiative themselves and 11.1% would do nothing (Fig 3B). While the vast majority of students favored taking some sort of action the fact that 11.1%—about one-tenth of students—would not attempt a productive response is unsettling. Further disconcerting is the fact that only 57.9% of subjects said that they usually discuss the problems that they face in their EE (Fig 3A). Since only slightly over half of the students are actively discussing these problems they may be missing out on opportunities to form effective collaborations to combat similar issues as their peers. This is extremely unfortunate seeing as a shocking 100% of students said that they think about solutions for the problems that they face in their EE (Fig 3A). This result makes a bold statement: students are already thinking about ways to improve their education. And when asked about the forces that were hindering students from being more proactive in their EE the most popular response was that they were “unsure of how to start” (32%), followed by “university policies” (28%) and a “lack of support” (20%) (Fig 3C). While students have shown that they carry the potential to fuel improvements in their EE, the proper forum to channel these ideas and support for students to actively pursue solutions may be lacking. Taken together these facts demonstrate the necessity of programs such as SPEED and the GSF, which serve to promote the EE conversation in universities worldwide. In light of the fact that 28% of students felt that university policies were a hurdle in their willingness to take charge in their EE, it is especially important to have an organization that is geared towards serving students.

Also in the pre-GSF survey, 31.6% of interviewed subjects reported that they experienced cultural barriers while participating in teams (Fig 3A). The fact that roughly one-third of program participants dealt with this issue suggests that students may not have sufficient opportunities for cross-cultural interactions in their current curricula. Additionally, 94.4% of students felt that participating in activities with students from different countries would be helpful in overcoming cultural barriers (Fig 3A), suggesting that students firmly believe that they would benefit from cross-cultural activities. One model of successful cross-cultural activities would be the ice-breaking sessions included in the forum, with 63.2% of surveyed students reporting that the ice-breaking sessions were helpful in bringing them out of their comfort zone and facilitating their engagement with other students (Fig 3A).

Post-GSF Analysis. Overall, GSF appears to have had a positive impact on its participants. At the conclusion of the forum 91.7% of interviewed subjects agreed that working in groups during the forum helped them to develop an appreciation for diversity in teams (Fig 4A) and 97.9% said that GSF was helpful to them in developing methods to overcome cultural/language barriers (Fig 4A). The combination of these results show that GSF had a strong influence on its participants in terms of learning how to gain an appreciation for multicultural teams and overcoming the challenges that may be encountered when working in such a diverse environment.

GSF also helped to put EE on the radar for its participants. At the end of the forum 93.8% of students reported that EE seemed like a more relevant and pressing topic directly as a result of their participation in the forum (Fig 4B). Furthermore, 79.2% of participants stated that they encountered new topics in EE that they would like to engage (Fig 4A). This data set indicates that students seemed to gain an interest in EE and an enhanced understanding of its relevance. Action Planning, one of the problem-solving methods that students used in the forum, was also reviewed positively by many students. At the end of the forum 91.3% of students said that they would utilize action planning as a problem-solving method in the future (Fig 4A) with 68.1% of students rating the effectiveness of action planning as an 8 or higher on a scale of 0 to 10 (Fig 4C). These results suggest that students may be open to learning or adopting new problem-solving methods and a program such as GSF may be the appropriate forum to introduce such tools to students. Lastly, in the post-GSF survey students were once again asked how they would respond to a problem that they could potentially face in their EE. At the end of the forum 52.9% of students said that they would work with their university while 47.1% said that they would take the initiative themselves (Fig 4B). It is also interesting to note that the 11.1% of students that said that they would “do nothing” in the pre-GSF survey dropped to 0% in the post-GSF results. There was also a 13.7% increase in students who would take the initiative themselves between the pre- and post-GSF results (Fig 3B & 4B). In short, GSF seems to have boosted the willingness of students to take action in their EE.

Conclusion

The GSF has developed into a well-established model for uniting a diverse group of students for the common cause of improving EE. With approximately one decade of GSF experience behind us it is a critical point in time for us to reflect on ways to further bolster our principal event. In the future we would like to develop more creative ways to preserve the strong sense of motivation that students develop for EE over the course of the forum, even after the conference is over. Perhaps this can be achieved by keeping students in touch with their GSF project teams, finding a sponsor to help fund and kickoff their projects, and assigning teams to SPEED mentors for ongoing collaboration and project development after the GSF. Our survey also provides future directions for our organization. The pre- and post-GSF survey results helped to characterize present gaps in EE—on a global scale—as well as evaluate the impact of GSF as a whole. We learned that students are already thinking about solutions to EE challenges, but not knowing where to start, university policies, and a lack of support hinder them. We should enhance our university relations to act on these findings. Furthermore, we should continue to survey students with a greater sample size in future forums. Once we collect more data it may even be possible to identify regional differences in student responses. In closing, as argued by Rugarcia et al., the 21st century engineer must be equipped to handle a wide realm of challenges that are not strictly in the form of technical engineering topics, such as globalized markets and social responsibility.⁴ Fortunately, the GSF model revolves around inclusion of these principles by motivating a diverse group of students to collaborate and enact positive change in their communities. The GSF provides a framework for international student collaboration, which can be applied to EE and beyond.

References

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