# Student Chapter Outreach Events and Student Involvement

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## Abstract

The American Society for Engineering Education (ASEE) Student Chapter at The Ohio State University (OSU) is unique from other ASEE student organizations. Traditionally, ASEE chapters are not outreach-focused organizations. However, the OSU Chapter has placed a core focus on community involvement. Over time, the group has participated in numerous outreach events focused on increasing student knowledge of and interest in engineering. These outreach events have provided students with exposure to the field of engineering. They have also had several effects on the structure and focus of the OSU ASEE Student Chapter. Over the past year, the layout of our Executive Board (E-Board) has changed and several of the roles have been re-defined. The overall direction of our chapter has also changed to better suit the new outreach focus. In this paper, we explore how outreach has changed our organization's structure, current direction, and future goals. We discuss the current structure of our E-Board and illustrate how our goals have changed through our future direction. Through our continued work, we hope to improve student interest in STEM at both our own university and the urban areas in which we do outreach.

## Introduction

Over the past few years, OSU's Student Chapter of ASEE changed its overall direction and goals. Instead of primarily organizing on-campus events for current collegiate members, the organization shifted its focus to off-campus outreach events for younger individuals. These outreach events have been geared towards primary and secondary students, with a particular focus on students who may lack knowledge of and resources to explore science, technology, engineering, and mathematics (STEM) fields.

During its foundation, OSU's ASEE student chapter was not an outreach-focused organization. However, during the 2014-15 academic year, the chapter changed its structure to support having regular outreach activities as the focal point of programming. As a result of this new approach, several aspects of the chapter's structure changed. First, several officers' roles were expanded. Committees were formed to stabilize the work structure. In addition, an outreach committee was formed with the Vice President (VP) and two Outreach Chairs to coordinate the chapter's ongoing events.

In this paper, we discuss the specific organizational effects that resulted from the organization's transformation. To lay groundwork, we discuss the structure of our E-Board within the context of its expanded roles. We follow up with a discussion of the current goals of our chapter. Finally, we discuss our past/current work on outreach and conclude with our future vision for the organization.

**E-Board Structure: Positions**

The E-Board of the ASEE at OSU has maintained a focus on leading and promoting engineering education. The group has organized various events from general body meetings for OSU undergraduates to outreach events for K-12 students. Similar to other national ASEE chapters, the OSU chapter's E-Board members have included a President, VP, Treasurer, Secretary, and Faculty Advisors. Additionally, the organization has had several unique positions such as Outreach Chairs and Engineers' Council (E-Council) Representatives. The present section contains the common responsibilities of all E-Board members as well as detailed job descriptions of each position.

All officers shared a list of common responsibilities:
- Attended mandatory events required of their positions.
- Maintained active membership with the ASEE National Organization.
- Kept good academic standing within OSU.
- Responsible for helping their successors through the transition.

In the beginning of the term, the President formed an annual plan for the organization based on recommendations from the old and new E-Board. The President's primary duties included organizing and presiding over all general body and E-Board meetings. The President also served as a liaison between the student chapter and the ASEE National Organization. When necessary, the President created or removed temporary positions/committees and ensured all activities of the organization aligned with the chapter's goals and constitution.

The VP's main role was to assist the President in performing duties of the office, including planning meetings. Consequently, when the President was absent, the VP was to assume the primary leadership duties. In addition to supporting the President, the VP was also required to act as a liaison between the E-Board and Outreach Committee. Furthermore, the officer ensured that a member of the E-Board attended E-Council meetings.

The Treasurer's role required a general training led by the Student Organization Management at OSU as the Treasurer's main duty was managing and keeping a record of ASEE funds according to the policies of OSU. After election to the board, his/her first responsibility was to compile and present a financial report of the previous year with the help of the previous Treasurer. Throughout the year, the Treasurer was required to oversee any fundraising activities or appoint

an officer to oversee them. Additionally, at the E-Board meetings, he/she gave a funding update to maintain transparency with the other officers.

Overall, the secretary was responsible for all documentation in a timely and orderly fashion. The secretary's main responsibility in the organization was to maintain records of events, activities, and meetings held by the organization. The secretary was also responsible for maintaining ASEE's membership list, including contact information.

The OSU ASEE Student Chapter currently has two faculty advisors, and they were in charge of facilitating the overall organization. These roles were more adaptable based on the individual advisor's desired involvement. One of the advisors helped with programming activities for ASEE, and the other oversaw the outreach activities alongside the Outreach Chairs.

The Outreach Chairs led the committee dedicated to outreach. They communicated with various outside contacts to organize and preside over the outreach events. At E-Board meetings, the Chairs shared information regarding past and upcoming events. Such communication helped maintain transparency and recruit volunteers for future events. Additionally, the Outreach Chairs led committee meetings alongside the Outreach Faculty Advisor.

E-Council Representatives attended E-Council meetings at OSU on behalf of the chapter. During E-Board meetings, E-Council Representatives reported on all relevant E-Council proceedings. Most updates included advertisements of events held by other engineering organizations at the university and volunteer opportunities at various engineering conferences.

In the beginning of the spring semester, the aforementioned officers were selected through a self-nomination and election process. For the upcoming year, the new officers were trained by old leaders. When necessary, some of the above positions were overlapped and performed by one officer. E-Board meetings were held biweekly to maintain communication between officers and to reach ASEE's goals and current direction, which are discussed in the following section.

**E-Board Structure: Committees**

Since the beginning of 2014, the previous president began a new approach of splitting the tasks of the E-Board members among different committees. The responsibilities and goals of the organization have been divided into three types of deliverables; Outreach, Programming/Advertising and Conference/Funding.

Out of this new perspective, the organization's outreach program grew and the overarching goal of the chapter changed. The Outreach Committee was led by the VP, two co-chairs, and a faculty co-advisor. Outreach became a major emphasis of the organization and the main selling point for new members.

The Programming/Advertising Committee planned and promoted chapter events, and was led by the organization's faculty advisor and president. Therefore, decisions regarding the organization's participation in future events and meetings were streamlined by the Programming Committee.

Finally, the Conference/Funding Committee worked towards meeting the organization's goals regarding the regional ASEE conference. The committee also managed funding for the conference as well as other activities for general body members. This team included the E-Council Representatives and the Treasurer. Therefore, the treasurer was held directly accountable for discussions regarding the organization's funding.

As a result, the Outreach, Programming/Advertising, and Conference/Funding Committees worked closely during the E-Board meetings to solve problems, answer questions, and work towards a common solution.

**Goals**

After E-Board elections for the current year, a transition and strategy meeting was held in which the team defined the organization's scope and direction. The team reviewed what went well and what needed improvement over the past year. This reflection brought to light the fact that, primarily, outreach programs drew in new members, which led to a desire for the organization to prioritize a more constant outreach program. We decided a steady outreach program would not only help with retaining new members but also better support the schools and students with whom we work. Understanding this, the team realized a new goal of building a consistent relationship with the schools and students to help make a positive change. The goal of a steady outreach program was defined as approximately four events per semester or one per month.

**Previous Work**

*Outreach Events: Year One*

During the 2012-2013 academic year, OSU's Student Chapter of ASEE began an initiative to focus on outreach activities with primary and secondary schools in the Columbus area. Prospective and current members of the organization consistently expressed interest in outreach events during involvement fairs and meetings. Also, despite national calls for more STEM graduates, statistics indicate that only 38.4% of freshmen at 4-year institutions intend to major in a science and engineering (S&E) discipline, with 10.3% indicating an interest in engineering. [1-6]

To align with the nation's needs and appeal to its members, the ASEE E-Board decided to look for outreach opportunities within the local community to spur student interest in engineering.

The student chapter began working with the Director of K-12 Education Outreach within the College of Engineering at OSU to identify potential collaborators. A local public high school indicated that they would like the chapter to participate in an outreach event. Through electronic communication and in-person meetings, a relationship evolved with the school.

*Birth of "Home" and "Away" Series*

A plan was developed for a "home" and "away" series in which ASEE members would oversee one outreach event at the local high school and host a second event with the group at OSU. The "away" event occurred first and consisted of a wind energy lab. ASEE volunteers also conducted an informal panel geared towards telling students what they wish they knew about engineering/college while they were still in high school. The follow-up "home" event involved a marble delivery system. The high school students also took a tour of OSU engineering facilities.

The wind energy lab had three primary objectives. By performing the lab, ASEE members hoped students would be able to: (a) determine the influence of wind turbine blade design on the amount of power generated, (b) investigate the optimum number of blades and possible blade orientations, and (c) realize the influence of pitch angle on power generated by a design. Through the lab experience, students interacted with equipment such as a power supply, wind tunnel, pitot tube, and data acquisition board.

The marble delivery system activity also had three primary learning objectives. By completing the exercise, ASEE officers hoped students would be able to: (a) gain experience working with a team, (b) implement the design process, (c) create and build a mechanical device that delivers up to 10 marbles from a tabletop to a receiving target on the floor. Through the design challenge, students used hundreds of K'nex pieces, a plastic cup, and marbles to achieve the aforementioned objectives. Overall, ASEE volunteers were pleased to see signs of student excitement (e.g., smiling, laughter, etc.) and interest (e.g., questions, curiosity).

*Outreach Events: Year Two*

During the 2013-2014 academic year, the ASEE student chapter continued its outreach efforts. Unfortunately, due to unforeseen changes in administration, the "home" and "away" series did not occur at the initial public high school.

*Modification of "Away" Series*

However, a similar outreach partnership began with a local charter high school. After discussions with the school, a single "away" event was scheduled. Some changes were made to the previous year's plan. To reduce the weight of equipment and risk of damage to components, the marble delivery system was used for the "away" event instead. Therefore, the lighter and more compact

kit was transported to the high school physics class. Similar to the prior "away" event, ASEE volunteers also conducted an informal panel to share what they wish they knew about engineering/college while they were still in high school.

**Current Work**

*Outreach Events: Year Three*

During the 2014-2015 academic year, the ASEE student chapter increased its outreach efforts. An existing partnership was maintained with a local charter school while new relationships were developed with another public high school and non-profit organization in the Columbus area.

When working with the local charter school, the marble delivery system was again used for a single "away" event with a new cohort of high school physics students. In addition to the lab activity, an informal student panel took place once again.

*Revised "Home" and "Away" Series*

The Director of K-12 Education Outreach within the College of Engineering at OSU connected the ASEE Student Chapter with another interested public high school in the Columbus area. A revised plan was developed for a "home" and "away" series in which ASEE members still oversaw one outreach event at the local high school and hosted a second event with the group at OSU. The "away" event still occurred first, however the lab activities were switched. This modification helped with transportation of lab equipment.

During the "away" event, students performed the marble delivery activity. The revised "home" event involved the wind turbine lab. Prior to the "away" event, an ASEE E-Board member sent OSU engineering-related videos to the school to spark excitement among students. At the "away" event, ASEE volunteers also conducted an informal panel geared towards telling students what they wish they knew about engineering/college while they were still in high school. At the "home" event, the high school students also took a tour of OSU engineering facilities.

*After-School Center*

After being put in touch with an after-school center associated with a homeless foundation, a three-week program was established due to the center's lack of funding for science and technology education. The center focused on tutoring and enrichment opportunities for the elementary-aged students who attended on a daily basis.

The first week included a partnership with a local center for science and industry. The students were divided in half based on grade level. Students in kindergarten through third grade participated in a "Gross Science" interactive workshop that taught them about germs. Activities included using glitter to demonstrate how germs spread, and making their own fake "snot" to take home. Concurrently, those in fourth through seventh grade took a "Beginner Robotics" course that covered basic programming concepts. These concepts were then applied to the construction of a small robot that could move independently. The duration of each workshop was one hour.

Weeks Two and Three consisted of an egg drop module. During the second week, students planned their vessels, selected common household materials for construction, and built it under time pressure. Each group had to decide on one design and determine exactly what materials would be required of them. The students exercised foresight by only being allowed to retrieve materials one time before construction. During the third week, students were given the opportunity to redesign based on what they learned in the past. The vessels were decorated, and the modules were then tested and evaluated.

**Future Direction**

In the future, the E-Board hopes to evolve the organization in two major ways: membership and outreach. These two realms fundamentally feed into each other, in that a higher membership will allow more ambitious outreach opportunities, but outreach is what draws in general body members that do not necessarily share the same interest in engineering education.

A large portion of our past efforts have included recruiting speakers to talk about current events in engineering education during general body meetings. While this appealed to a small core of students interested in that field, we felt a wider audience was being neglected. We have begun the transition toward a more hands-on approach to these general body meetings and hope to continue along this path. Rather than being lecture-style, we want to increasingly make meetings interactive so students can actively take part in the educational process and bond with each other. If our membership increases by 150% over the next year, we feel these efforts will have been successful. We believe that this approach has great potential for improving retention of general body members by making students feel more invested in the organization.

In addition, we also hope to attach more focus to outreach efforts. While students may not be explicitly interested in the field of engineering education, they often do want to give back to their communities through outreach efforts. Building partnerships with at least five local schools each year will be a priority in the future, so that a foundation will have been established and hosting a larger number of events will be possible. Additionally, we'd like to begin expanding the activities we offer, by encouraging creativity among our members in order to create new ways of

engaging student curiosity in engineering. We are interested in connecting with other nearby university chapters in order to achieve this goal.

## Conclusion

The American Society of Engineering Education at Ohio State University is building on the past in order to become an indispensable asset to area high schools and a resource to students interested in pursuing STEM degrees and careers. As compared to previous years and similar organizations, the Ohio State Student Chapter is taking a novel approach. The additional role of E-Council Representative connects our chapter with the work of other organizations throughout campus. The structure of committees into programming and outreach allows us to concentrate our efforts and accomplish more during the year. Finally, our new commitment to outreach has created a ripple effect throughout the group, reaching into expanded membership and mentorship. Through our expanded efforts, we hope to promote the improvement of engineering education at a large university and in the surrounding urban areas.

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