Leg-Up: Helping Youth Apply Engineering

Tycho K. Fredericks  
*Western Michigan University*, tycho.fredericks@wmich.edu

Steven E. Butt  
*Western Michigan University*, steven.butt@wmich.edu

Follow this and additional works at: https://scholarworks.wmich.edu/acad_leadership

Part of the Engineering Commons, and the Higher Education Administration Commons

WMU ScholarWorks Citation

https://scholarworks.wmich.edu/acad_leadership/10

This Poster is brought to you for free and open access by the Office of Faculty Development at ScholarWorks at WMU. It has been accepted for inclusion in Academic Leadership Academy by an authorized administrator of ScholarWorks at WMU. For more information, please contact wmu-scholarworks@wmich.edu.
Over the past decade, Dr. Tycho Fredericks and Dr. Steven Butt, of the College of Engineering and Applied Sciences, have had numerous interactions with middle school and high school students traveling through the College on outreach trips and recruiting visits. It was through these interactions that they noticed many students had difficulty applying basic math and science skills learned in school to solve open ended problems. More specifically, the students were not able to understand how to use the scientific method to solve design challenges (open-ended problems). In fact, when students were asked where they should use the scientific method, the most common response was “in the science fair”. When asked where else one might use this type of methodology, the general response was a blank stare. Thus, there seemed to be a gap between what students were learning in the classroom and the application or utility of the knowledge in the real world. Leg-Up was created to fill that void.

Objective

Leg-Up was designed to immerse middle school students in real world problem solving. It allows students to select a problem they deem important and with the aid of mentors determine a solution via the scientific method.

Pilot - Participants

Four 8th graders from Paramount Charter Academy in Kalamazoo, Michigan participated in the inaugural year of Leg-Up. Permission to participate was granted by the students, parents, teachers, middle school dean, and principal of the school. To participate, the students chosen by the school had to commit to coming prepared to WMU once a week for a minimum of two hours from September through May.

Outline of Activities

- Ice Breaking Activities
- Team Forming
- Bug Lists & Brainstorming
- Identifying Opportunities
- Reading Materials
- Project Selection
- Construction of Hypotheses
- Literature Review
- Demonstrations
- Surveys
- Revision of Hypotheses
- Experimentation
- Interpretation
- Documentation & Presentations

Background

Leg-Up 2006

1. Group 1: Effects of Drumming on the Body

- Dorsal ganglia - PO24
- Hypothalamus PO24
- deference PO24
- AIDS PO24

2. Group 2: Do Moldy Reeds Cause Disease?

- Hearts
- Lungs
- Brain
- Liver
- Stomach

3. Lessons Learned

- Research can be fun
- Math and Science may now be the career of choice
- This age group can be more creative than college students
- WMU is great

Next Steps

At the end of the year, the four students were required to present their projects to the 6th, 7th, and 8th graders and faculty at Paramount Charter Academy (> 200 students). The response from the students, faculty, and parents to their presentation was amazing. At first, we were unsure of how the students would react to presenting in front of such a large crowd, but both the student teams seemed to thrive on the excitement. The teams did such a great job that there was no need to advertise this year for the new cohort. Paramount Charter Academy had to develop their own application process to deal with the number of students requesting to get into this program. This year, another team from the Gagie School will be added to Leg-Up along with two teams from Paramount.

It is also worth mentioning that the Kalamazoo Gazette and WWMT News Channel 3 both did short news pieces on this program last year. The Gazette coverage was picked up by the American Society of Engineering Education’s media arm which further disseminated this endeavor internationally.

Acknowledgments

We would like to thank Ms. Amy Lawrence (Paramount Charter Academy), Ms. Anna Kamphaus (MS student - IE WMU), and Ms. Fehime Unlu (PhD student - IE WMU) for the countless hours that they put forth to make Leg-Up’s first year a success.