



STEM Ambassador Program

Dr. Afrin Naz, West Virginia University Institute of Technology

Dr. Afrin Naz is an assistant professor at the Computer Science and Information Systems department at West Virginia University Institute of Technology. She is working with high school teachers to inspire the K-12 students to the STEM fields. In last four years Dr. Naz and her team launched six workshops for high school teachers. Currently her team is training the high school teachers to offer online materials to supplement their face-to-face classroom.

Dr. Mingyu Lu, West Virginia University Institute of Technology

Mingyu Lu received the B.S. and M.S. degrees in electrical engineering from Tsinghua University, Beijing, China, in 1995 and 1997 respectively, and the Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign in 2002. From 2002 to 2005, he was a postdoctoral research associate at the Electromagnetics Laboratory in the University of Illinois at Urbana-Champaign. He was an assistant professor with the Department of Electrical Engineering, the University of Texas at Arlington from 2005 to 2012. He joined the Department of Electrical and Computer Engineering, West Virginia University Institute of Technology in 2012, and he is currently a professor. His current research interest includes wireless power transmission, radar systems, microwave remote sensing, antenna design, and computational electromagnetics. He was the recipient of the first prize award in the student paper competition of the IEEE International Antennas and Propagation Symposium, Boston, MA in 2001. He served as the chair of Antennas and Propagation Society of IEEE Fort Worth Chapter from 2006 to 2011. He is currently serving as the treasurer of IEEE West Virginia Section.

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Tommi Kenneda is a student at West Virginia University Institute of Technology, pursuing her bachelors in computer science. She is expected to graduate May 2022. She is a research assistant where she works with WV schools to inspire students to pursue a STEM career.

STEM Ambassador Program

(Research-to-Practice)

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Introduction

In this paper we describe our experience with our “STEM Ambassador Program,” in which female university students in STEM Background serve as the STEM Ambassadors of female high school students. The project is sponsored by American Association of University Women (AAUW) and NASA WV Consortium. The ambassadors, who graduated from high schools recently, will mentor high school girls in their high school study. Specifically, about 10 undergraduate students of West Virginia University Institute of Technology with STEM majors (preference is given to first-generation college students) are serving as the ambassadors of female high school students. The ambassadors started their university study recently; in other words, they are just several years ahead of the high school students. As a result, it would be natural for them to become the role models of high school students. Parental and guardian engagement is also a critical piece of this educational initiative as most of these female student’s parents either did not go to college or are not in STEM fields. We have designed a range of activities around the year to educate the parents in STEM programs and careers available around the state.

Motivation and prior work

This project is based upon our prior efforts to serve female high school students¹⁻². Since 2014, a one-week camp named STEM Summer Academy is organized by West Virginia University Institute of Technology for female high school students in every summer, sponsored by Toyota Motor Manufacturing West Virginia. The Academy has demonstrated significant impact on the participating female students. Surveys collected from the participants showed that, about 76% of the girls changed their career preferences to science or engineering after attending the Academy. The proposed “ambassador program” will be integrated with our prior efforts. Specifically, with the initiation of the proposed ambassador program, our interaction with female high school students will become “two-way” rather than “one-way.” Through the Academy, female high school students stay on our university campus for one week, learn STEM knowledge and skills, and communicate with university students and faculty. Through the proposed ambassador program, university students visit high schools during regular semesters and offer them on-site assistance. With these two elements integrated, we reached a large number of female high school students and maintain year-round interactions with them. We are conducting both summative and formative assessments. We believe its success will set up an excellent model of strengthening the collaborative relationship between universities and K-12 schools. The successful model and experience collected from this project would be promoted to other counties of West Virginia and other states.

Through the STEM ambassador program, the following three outcomes are anticipated.

Outcome 1: Female high school students' performance in their math and science courses is improved.

Outcome 2: Female high school students' interest in STEM disciplines is increased.

Outcome 3: High school students' parents become more knowledgeable about STEM.

Implementation plan

Implementation plan of the proposed ambassadors program includes the following three tasks.

Task 1: Train female undergraduate students to become the ambassadors.

In the summer of 2018, a training workshop was organized at West Virginia University Institute of Technology. About ten female undergraduate students attended the workshop, and four of them were selected to become the ambassadors of female high school students. Priority was given to students with southern West Virginia background such that it would be more natural for them to become the role models of high school students of southern West Virginia counties; particular priority was given to first-generation, low-income, and minority students. In the workshop, female undergraduate students learned several engineering projects mapped to high school math/science standards. The training was also extended to improve their leadership and communication skills for them to work with younger girls better.



Figure 1: Ambassadors Jordan Bowen working at a high school.

Task 2: Establish mentorship relationship between female university students and female high school students.

Task 2 constitutes the core of this project. With the support from local school districts, in August 2018 the ambassadors program was initiated at high schools of Raleigh and Fayette Counties. Under the supervision of high school teachers, the ambassadors met female high school students through certain after-school activities. Usually there are 8 to 12 female students per session. The ambassadors not only help female high school students with their math and science coursework, but also inspire their interest in STEM disciplines. The ambassadors who are from similar background and only few years ahead of the high school participants, share their own successful story from high school to college in STEM fields. High school students are highly encouraged to conduct science/engineering projects with the ambassadors. Expensive equipment like robots and laptop computers are loaned to Raleigh and Fayette County Schools by West Virginia University Institute of Technology.

Task 3: Organize “Family STEM Night”.

A “Family STEM Night” was held in the summer of 2018. Female high school students, their parents, female university students, female university faculty members, and female professionals from local companies attended the Family STEM Night. A range of information related to STEM majors was provided to the parents. Through this event, the adult participants are expected to be more knowledgeable about STEM, and in turn, would play a more constructive role in their daughters’ education.

Raleigh and Fayette County Board of Education are committed to providing all the administrative support (such as recruiting participants and offering facilities) for this project. We have been working closely with African American Collaborative in order to increase the ethnic diversity of the high school students who participated in our STEM Summer Academy; this endeavor will be extended to the proposed ambassadors program.

Evaluation

To measure this project’s efficacy at achieving the expected success, we have designed various instruments to collect data throughout this project.

Indicator 1 High school students’ intention to pursue STEM career will be assessed using Social Cognitive Career Theory. Students will take surveys about their intentions to pursue career in STEM disciplines prior to and after participating in the ambassadors program. The model of Social Cognitive Career Theory accounts for the development and influence of students’ self-efficacy, expected outcomes, and interests in STEM professions.

Indicator 2 Parents will respond to a survey regarding their conceptions toward STEM before the ambassadors program, after they attend the “Family STEM Night,” and after the ambassadors program. Success will be indicated by positive changes in parents’ conceptions toward STEM across time.

Since fall semester of 2018, our Ambassadors are visiting schools of southern West Virginia. At least 18 high school teachers and more than 200 female high school students have participated in

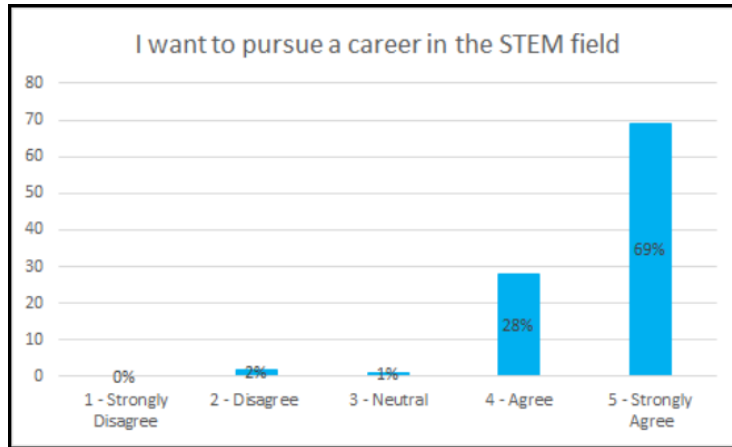


Figure 2: Survey answers from the participants

the Ambassador program actively. Ten female undergraduate students of West Virginia University Institute of Technology are currently serving as the Ambassador of high school students. According to the feedback we have collected, most of the participating female students respond that they become more knowledgeable about STEM and considering joining college in a STEM field. In figure 2 we are demonstrating our results from the participants of Ambassador program. The participants responses for survey question if they want to pursue a career in the STEM field are demonstrated. As can be seen from the diagram 69% of these young women answered, “strongly agree” and 28% answered “agree”. It is estimated that more than 150 parents have been engaged directly or indirectly through this project. Over the surveys, numerous parents said that they gained knowledge about STEM disciplines, available scholarship programs, and prospective STEM jobs in West Virginia. The parents also find it tremendously beneficial that their daughters are mentored by female university students, especially by first-generation female university students.



Figure 3: Attending local conference

We are taking our Ambassadors and their mentees at local events. In figure 3 we can see four ambassadors (Jordan, Mary, Rebecca, and Isabel) and five mentees (Nevaeh, Maryam, Calia, Mya, and NanaAmma) at 2018 Women and Technology Conference in Charleston, West Virginia.

Acknowledgment

The authors would like to thank American Association of University Women (AAUW) and NASA WV Consortium for providing the financial sponsorship.

References

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