



**Science, Technology & Engineering Preview Summer Camp
University of Wisconsin-Stout**

2019 Annual Report

STEPS for Girls
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This report summarizes operation, activities and highlights, and camper outcomes as conducted in the summer of 2019. While much of the STEPS camp experience remained the same with respect to curriculum and activities, there were some significant changes as compared to past camp offerings.

OPERATIONS

In our twenty-third year of conducting STEPS for Girls on the UW-Stout campus, 159 girls participated as campers (full enrollment, 160 girls registered with one no show). To ensure that cost was not a factor for a girl to participate in STEPS, a number of registration waivers (provided by either private or industry sponsors) were granted to campers who are eligible for free or reduced lunch in school and/or are members of a minority population. In order for a camper to be eligible for a registration waiver, she had to write an application that included why she wanted to attend STEPS for Girls. Companies and some private donors also provided registration waivers for campers either as a result of a school contest or through identification by the school itself. A total of 71 campers were able to attend camp for free.

Active recruitment efforts for the 2019 camp involved the following: having informational booths at various STEM outreach events and school posters and bookmarks mailed and delivered to a large number of schools. Registration for STEPS opened at the end of January 2019 and camp weeks were full on March 1, 2019. Once camp weeks were full, a waiting list was generated. The waiting list was closed when it contained 50 campers (mid-May).

Duties involving planning, execution of the camp and human resources responsibilities were shared by the STEPS Lead Team of Dr. Jo Hopp, STEPS Program Director, Professor of Physics at UW-Stout, Vicki Price, STEPS Camp Coordinator, Brigit Pettit, STEPS Camp Director, Meghan Walters, STEPS Technical Director, Jacqueline Radke, STEPS Head Counselor and Kylie Anderson, STEPS Assistant. Office support was also provided throughout the spring by Kaitlyn Eyerly.

STEPS for Girls was housed at UW-Stout and utilized the laboratory, classrooms, housing, dining and recreational facilities at UW Stout for its programming. STEPS campers were housed on the fourth floor of McCalmont Hall, which kept the campers on the main campus close to their daily activities.

Changes and important continuations in 2019 – STEPS 2019 brought some exciting changes that will continue to enhance and grow camp into the future. In addition, we continued some existing programming which had substantial impact on our campers and staff.

- Registration for STEPS moved to an online system. The STEPS Program Director and Camp Coordinator worked with My Online Camps to provide an easy and efficient way for camp families to register for camp. This method of registration was very well

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received. It enabled camp families to receive confirmation of registration immediately, provided flexible payment options, and seeming made accessibility for registration better. We attribute our very quick “fill” time, in part, to the ease of this system. When the system was first introduced, we were somewhat concerned that it would cause a barrier for our campers wanting to apply for a registration waiver. As such, we put procedures in place to avoid camp filling up before eligible campers could apply for the waivers. We did not find this to be the case, however. In fact, in the first two weeks of registration opening, all of our 30 available registration waivers were awarded. In our past 23 years, we have not had that level of response to the registration waiver program. The online system appeared to empower our camp families. It also encouraged me to seek additional funds to support more than 30 campers through our STEPS awards. Indeed, I was able to add 6 camper registration waivers.

- The “There’s STEM in *what?!?!?*” class was added to the STEPS curriculum. This class brought in industry professionals to share information about various career possibilities that involve STEM that our campers may not realize. For example, one of our volunteers talked about STEM in apparel design and another talked about STEM in architecture. The classes were hands on and engaging. It was a wonderful addition to the curriculum, and we plan to expand it in future camp years. A full listing of the topics covered are in the Appendix. A total of 10 industry professionals spoke with our campers from 6 organizations. In our first year of the class, we were unable to fill all available presentation opportunities. When a time slot did not have an outside presentation, we had Kylie Anderson, Camp Assistant, talk about UW-Stout. Kylie graduated from UW-Stout and is currently a graduate student at the institution. She spoke about UW-Stout programs and opportunities. This class will continue in future years (we already have a number of outside parties interested in participating) but will be adjusted for length of time, per feedback from the staff.
- The “Leadership” class was added to the STEPS curriculum. This class was run by the counselors of each color team and assisted by a 4-week lab assistant. This class was an outcome of the BOLD STEPS leadership programming in which our camp staff participates. As part of that program, the participants develop a leadership activity to do with the campers. The counselor, 1-4 week LA and 2-2week LAs plan the activity and then it is run by the counselor and 4 week LA (the 2 week LAs have different duties during this time). This class was well received by the campers, provided our young staff to practice the leadership skills they were working on in the BOLD STEPS program and get feedback on that experience, and engaged the campers in a lively and team-building event. This class will continue in future camp years, but will be adjusted for length of time, per feedback from the staff.
- The STEPS Technical Classes had significant modifications in Multimedia and Mathematics, along with minor modifications in Cross-Media Graphics. The Multimedia class went through a major overhaul and development of a new artifact, as described in the Appendix. The response to the interactive map, which is now available to the campers for their camp memories, was very positive. In mathematics, our long-term math teacher worked with an industry professional to modify the curriculum and then co-teach the class. The curriculum is much more interactive and engaging for the

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campers and was very well received. In cross-media graphics, our instructor was able to secure a donation of fun material for the girls to print on. She also added a new take-home – a locker mirror! This was well received by the campers and we hope they used it at school to remind them of their awesome STEPS experience.

- This spring we added a Camp Office Assistant. This position is a student-worker position and has been truly invaluable. We have continued to support this position in the fall. The office assistant helped organize documentation for camp, process order deliveries and document camp procedures.
- Our efforts to connect more significantly with camp alumni continued this year. Two specific new initiatives were made. First, we worked with the UW-Stout marketing office to send out an email to all eligible STEPS alumni to making them aware of the scholarship opportunity that exists for UW-Stout students that are STEPS alumni majoring in one of the fields highlighted by the STEPS program. We also sent out a “Senior” email to all STEPS alumni and graduating high school seniors asking them to update their alumni information. Finally, we simplified the alumni information request form to increase the likelihood that alumni will complete the entire form. We were able to update our alumni database through these efforts and will continue with the scholarship and senior outreach efforts. At the time of this publication, we are also working on additional alumni outreach efforts.
- STEPS 2019 saw a new photography plan that was highly effective and empowered our Junior Counselors to take a more active role during classes and our Night Counselor to have more substantial duties. Since we do not allow our campers to have electronic devices, including cell phones, and we want them to focus on their camp activities instead of spending time taking pictures of their experiences, we had the junior counselors and counselors take pictures throughout the day. Each evening, our counselors gave the night counselor their cameras and she uploaded the pictures to a private Shutterfly Site. Camper families have password protected access to that site for their own use in downloading camp pictures for memories. We got a lot more pictures this year and each girl was able to have a number to choose from!
- The duties of the night counselor increased and made it a more engaging role for her. While she stayed awake all night to be available for campers, the night counselor restocked the color counselors’ medical kits (if items were used during the day) and uploaded the daily pictures and videos to the Shutterfly account.
- STEPS 2019 was a year of better organization. Each counselor received a detailed camp binder, with various contact information, medical forms, clear and accessible camper information and supply details. Their camp backpacks were better organized for feminine products and medical supplies, and their pre-camp training was outlined in a clear and understandable fashion. Camp counselors felt better prepared this year for their job duties and communication between the counselors and camp staff was facilitated as a result.
- The BOLD (Building Opportunities through Leadership Development) STEPS program, an immersive leadership development program for our lab assistants and counselors, was continued for the second year. As with its initiation last year, this program was integrated into the camp duties of the lab assistants and counselors and

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allowed them to immediately utilize and reflect on the skills they were learning as they performed their normal camp responsibilities. We, once again, had a number of industry volunteers participate in the program, and it was facilitated by Dr. Jo Hopp, (Jo is also the program director for STEPS). The curriculum changed slightly from 2018, based on feedback from our participants. A full report of the BOLD STEPS program is available upon request. The program went through a formal evaluation process and those results are available in the BOLD STEPS report.

- STEPS continues to use the Graphic Communications Program at UW-Stout to produce all its print materials. This educational relationship with the Graphic Communications Program is strong and will continue in future years. This year the UW-Stout students produced marketing materials sent to schools (posters and bookmarks), notepads used in the STEPS office, bug-bot stickers for our campers and formal thank you cards.
- One of the highlights of each camp week is the company tour. This year we continued our practice of having industry professionals participate as tour chaperones so our counselors could attend their BOLD STEPS programming. Volunteers from UW-Stout Foundation, UW-Stout faculty, the Menomonie Lions and 3M participated as industry tour volunteers each week. This provided another opportunity for campers to engage with professionals in a variety of disciplines, but primarily STEM fields. The chaperones were well received, and the campers enjoyed the opportunity to interact with additional professionals.
- Our industry volunteer program expanded once again this year. This particular program has really become a highlight of what we do well at STEPS. We had nearly 70 women from 23 organizations participate as volunteers. This is up from our first year of this program in 2017 where we had 23 women from 6 organizations. Volunteers participated as classroom instructors, classroom lab assistants, chaperones and BOLD STEPS facilitators. Volunteers interacted with our campers and shared their stories. Their participation was very positively received.
- STEPS continued its focused efforts on fundraising. Over 80% of camp funds come from donors. Donors included private individuals, companies, foundations and UW-Stout. The camp director continues to maintain relationships with donors, apply for funding opportunities and develop new relationships. We continue to recognize our donors in print, online and in social media outlets. Support, as highlighted in the report, includes both long-term corporate and private donors as well as new corporate and private donors and grant awards (8 new donors in 2019).
- We have maintained the STEPS camper award program for each week. Our head staff, counselors and lab assistants identified specific campers for four types of awards (Confidence Award – sponsored by the Hampton Family Trust, Curiosity Award – sponsored by 3M, Emerging Leader Award – sponsored by UW Stout and the Book Awards – sponsored by Dean Neuburger). The Confidence, Curiosity and Emerging Leader Awards were presented by STEPS Family level donors during graduation. The books for the book awards were provided by a private donor and the campers who received these awards were identified at graduation.

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- STEPS Appreciation Day was run in a similar fashion as 2019, but we only had 2 options for hands-on activities (metal casting and graphic communications).
- Similar to camp 2018, during the academic year, STEPS and UW-Stout supported the STEPS Program Director position. Since the STEPS Program Director is a member of the UW-Stout faculty, this was accomplished through a release of normal faculty duties. This release was highly beneficial, as the program director could devote additional time to the organization and development of the program. The enhancements made in 2019 are a direct result of the ability for the director to focus efforts on STEPS. STEPS will continue its efforts to provide this support for the Program Director position.

CAMP ACTIVITIES

For the first ten years of its existence, the product manufactured in STEPS was a radio-controlled model airplane (1997-2006). For the next six years, the product was a radio-controlled boat (2007-2012). Beginning in 2013, the core technical activities of the camp were focused on manufacturing an obstacle-avoiding robot that each girl built herself and took home. These activities took place within state-of-the-art classrooms and laboratories at UW-Stout, under the guidance of UW-Stout faculty and industry professionals. Activities include classroom instruction, recreation, and company tours. See Appendix A for details of all camp activities.

STEPS CAMPERS

The registration process for camp moved to an online system (My Online Camps) in 2019. This change seemed to have a substantial impact on our camper families' ability to register for camp and request registration waivers. As such, we filled camp by March 1, 2019 and were able to award over 30 camper registration waivers within the first few weeks of opening our registration. Once camp was full, we maintained a waiting list until that list became 50 campers long (mid-May). Knowing we would not reach the bottom of that list, since camp openings are so rare after filled, we closed the waiting list option.

STEPS campers continue to come from a variety of locations. The large majority of STEPS campers come from Wisconsin and Minnesota, but STEPS 2019 also welcomed campers from Illinois.

STEPS continues to work towards increasing ethnic diversity in our camp. STEPS 2019 had 16.3% campers identify as non-white. Unfortunately, this year our demographic data was removed from the online registration materials (something that will be remedied in 2020), and so ethnicity reporting occurred by campers during their camp pre-survey rather than by parents registering for camp. We continue to offer registration waivers for minority campers. Much of our fundraising efforts are focused on providing registration waivers.



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STEPS also strives to offer this camp experience to those who may not have the financial means to attend. We continue to offer registration waivers for campers from low income households as defined by eligibility for free/reduced lunch in schools. As previously stated, much of our fundraising efforts are focused on providing registration waivers.

STEPS IMPACT

As reported in previous years, the success of STEPS is significant. Through a voluntary pre- and post-camp survey, perceptions about science and engineering fields are assessed each summer. The surveys consistently show increased interest in STEM topics by program participants, across all weeks, along with a greater awareness of the importance of science and technology in everyday life. Further, confidence of campers in their ability to do science and technology also show significant increases. Please see Appendix B, for the Executive Summary of this year's camper surveys and Appendix C for the Infographic highlighting many of the key impacts of STEPS. Results and dissemination of the survey were performed in collaboration with the Applied Research Center (ARC) at UW-Stout. The experience of our junior counselors is also surveyed at the end of each camp week. Results of our junior counselor surveys are also included in Appendix B

UW Stout Collaboration

The STEPS program works with UW-Stout faculty and college students to provide real client experience. This is in direct connection with the UW-Stout philosophy of "hands-on, minds-on" experiences. For camp 2019, we entered into a number of relationships across campus. Of particular note was our involvement with the students in the Graphic Communications program. These students produced our school marketing materials, including posters and bookmarks. They also produced notepads, thank you cards, and feet stickers for our campers to decorate their bug bot houses. The Stout Typographical Society (STS) was employed to produce our camp t-shirts. They produced t-shirts for campers, junior counselors, lab assistants and industry volunteers. STS also created the screens campers used during the graphic communications class to make their team bandanas as they learn about the screen-printing process.

CAMP STAFF

Program Director

Dr. Jo Hopp, professor of physics at UW Stout, was the 2019 STEPS Program Director. Jo has been involved with STEPS for the past 14 years as a physics instructor, human resource director, interim program director and program director. The program director position is year-round. Duties of the program director include camp fundraising, marketing, operations, camp preparations and registrations, overseeing the volunteer program and hiring and supervising camp staff. In addition to the program director duties, Jo also is the human resources director, which involves



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developing, processing and maintaining STEPS contracts. Finally, Jo is the lead facilitator and curriculum development manager for the BOLD STEPS program.

Camp Coordinator

Vicki Price served as the 2019 camp coordinator. Vicki has served in this role for the past 6 years. The Camp Coordinator position is a support staff position to the Program Director during the academic year and the camp staff during the summer. The duties of the camp coordinator include communication with prospective camp families, camper registrations, updating all camp materials, supply orders and general camp administration duties.

Camp Director

Brigit Pettit served her third year as STEPS Camp Director in 2019. Brigit has been involved with STEPS for the past 13 years as a camper, junior counselor, lab assistant, counselor, head counselor and assistant director. The duties of the Camp Director are to oversee all camp activities during the summer, including camper group assignments, health care head staff, house mother for lab assistants, interface with industry volunteers and manage camper records during camp. During the year, the Camp Director is in direct contact with the Program Director to help facilitate camp preparations, as needed. Brigit was also a facilitator for the BOLD STEPS program. Outside of camp, Brigit is a high school teacher in Marionette, WI.

Technical Director

Meghan Walters served as the 2019 STEPS Technology Director and this was her 16th summer being a part of the STEPS for Girls Program. She started out as a camper in 2003 and came back as a junior counselor, lab assistant, counselor, instructor, and head counselor. Meghan graduated from the University of Wisconsin-Stout with a Bachelor's Degree in Technology Education and has a great knowledge of the campus and the professors involved with STEPS. Meghan is currently a Tech. Ed. teacher in the Colby (WI) School District. The duties of the technical director include supervision and training of the lab assistants, providing material ordering needs to the camp coordinator, maintaining STEPS equipment before and during camp, ensuring all materials are available for classes, ensuring bug bots are operational prior to campers' departure and trouble-shooting all technical difficulties during camp. During the year, the technical director is responsible for identifying the lab assistants for the summer (through an application process) and providing pre-camp ordering information to the camp coordinator. The technical director also served as a house mother for the lab assistants.

Head Counselor

Jacqueline Radke served as the 2019 STEPS Head Counselor and this was her 9th summer being a part of the STEPS for Girls Program. She started out as a camper in 2010 and came back as a junior counselor, lab assistant, and counselor. Jacqueline graduated from St. Olaf College with a degree in both Economics and Theater. She is currently serving as CFO of a start-up education

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technology company in New York, NY. The primary duty of the head counselor is to train and supervise the activities of the four team counselors and the night counselor. The head counselor also serves as a house mother for the lab assistants. During the year, the head counselor is responsible for identifying the counselors and the junior counselors for the summer (both through an application process), as well as providing input to the ongoing development of camp programming. Jacque is also serving as the evaluator for the BOLD STEPS program.

Camp Assistant

Kylie Anderson served as the camp assistant in 2019. Kylie has been very active in the STEPS program for a number of years. She was a STEPS camper in 2010, a lab assistant in 2014 & 2015 and was part of the counseling staff from 2016-2018. After she graduated from UW-Stout in May 2018, we reinstated the Camp Assistant position to provide Kylie a transition time between junior and lead staff at STEPS and to learn about the various roles in the camp. Kylie's main duties were to support the efforts of the Camp Director and Camp Head Counselor. Kylie also produced the weekly video for our camp graduation.

Camp Office Assistant

Kaitlyn Eyerly served as the 2019 student assistant. Kaitlyn has been actively involved in the STEPS program in a number of roles and, as a UW-Stout student, was an ideal candidate for our spring position of student assistant. Kaitlyn was a STEPS camper in 2011, a junior counselor in 2014, a lab assistant in 2015 & 2016 and has been part of the counseling staff, as both a night counselor and color counselor, in 2018 and 2019. Kaitlyn supported the work of the Camp Coordinator and Camp Program Director throughout the spring semester and early summer. Kaitlyn has continued as office assistant in the fall semester 2019.

Counselors

Camp 2019 saw a couple of new faces in the role of counselor. We had an amazing team of college-age young women leading our campers through their week. The following is a list of the individuals and their designated "team". The night counselor is not assigned a team, but instead remains awake in the residence hall to provide security and maintain discipline while the campers and counselors are sleeping. Additional duties of the night counselor are to do camper and staff shirt (provided) laundry, watch for severe weather, general floor organization, refill counselor medical kits, upload camp pictures and support the Camp Director, as needed.

Shannon Kysylyczyn

*Senior, Welding Major, Saint Paul Community and Technical College
STEPS Participant 2010*

Pink Team Counselor

Kaitlyn Eyerly, Cadott, WI

*Junior, Human Development and Family Studies, UW-Stout
STEPS Participant 2011*

Green Team Counselor



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Junior Counselor 2014
STEPS Lab Assistant 2015 & 2016
STEPS Night Counselor 2017 & 2018
STEPS Office Assistant 2019

Ashley Morseth, Webster, WI Teal Team Counselor
Freshman, Applied Biochemistry and Molecular Biology, UW-Stout
STEPS Lab Assistant 2017 & 2018
STEPS Participant 2013

Kelsey Leach, Menomonie, WI Orange Team Counselor
Sophomore, Biochemistry Major, MN State University Moorhead
STEPS Orange Team Counselor 2018

Esther Gland, Bastrop, TX Night Counselor
Junior, Biochemistry Major, Arizona State University
STEPS Participant 2010
STEPS Green Team Counselor 2018

Junior Counselors

The counselors were assisted by a different junior counselor each week. Junior counselors were STEPS alumni of the class of 2016. The junior counselor position is a voluntary position and is obtained through an application process. Applications for junior counselor positions were opened in January 2019 and an email invitation was sent to all eligible STEPS alumni (girls entering 9th grade). We received over 60 applications for camp 2019. This is a very strong response considering there are only 160 girls eligible to apply.

Week 1:

Elizabeth Keller
Katherine Loff-Peterson
Caterina Wood
Elisabeth Woodward

Week 2:

Louise Hartwell
Nadia Kuxhausen
Maysa Marais
Anna Thomley

Week 3:

Sarah Gunderson
Maya Hamdan
Rachel Olson
Siri Hokanson

Week 4:

Madeline Schearer
Ella Pribyl
Zoe Riordan
Zoe Carter

Lab Assistants

In 2019, 16 STEPS alumni served as lab assistants. Lab assistants were assigned duties in automation, chemistry, electronics, metal casting, graphic communications, math, bug bot

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manufacturing, plastics, physics, robotics, and bug bot games. Lab assistants worked for either 2 or 4 week assignments. The assistants that worked all four weeks provided a nice consistency for the work. Lab assistants were housed in UW-Stout dorms and were supervised by house mothers, which included the Camp Director, Head Counselor and Technical Director. Supervision and primary training for the lab assistants was done by the Technical Director in collaboration with some class instructors. Training for the lab assistants occurred on the Saturday prior to the start of camp weeks 1 and 3.

Lab assistants were hired through an application process. Applications for lab assistants were activated in late January 2019. An invitation email was sent to all STEPS alumni eligible for a lab assistant position (past campers entering 10th or 11th grade). We received over 50 applications for Camp 2019.

STEPS Lab Assistants (Alphabetical Order)	
Emily Flaatten <i>Stanley, WI – Class of 2021</i> STEPS 2015	Saija Maki-Waller <i>Northfield, MN – Class of 2021</i> STEPS 2015
Jordan Gilles <i>Cadott, WI – Class of 2021</i> STEPS 2015	Mae Myers <i>Colfax, WI - Class of 2020</i> STEPS 2014
Karac Hanson <i>Evansville, WI – Class of 2020</i> STEPS 2014	Kaitlyn Neumann <i>Hixton, WI – Class of 2021</i> STEPS 2015
Ren Juza <i>River Falls, WI – Class of 2021</i> STEPS 2015	Rosemary Randall <i>St. Paul, MN – Class of 2021</i> STEPS 2015
Cassidy Knops <i>Menasha, WI – Class of 2020</i> STEPS 2014	Payton Reidinger <i>Marathon, WI - Class of 2021</i> STEPS 2015
Elena Knops <i>Menasha, WI – Class of 2020</i> STEPS 2014	Katie Riley <i>Colfax, WI – Class of 2021</i> STEPS 2015
Emma Leider <i>St. Cloud, MN – Class of 2021</i> STEPS 2015	Jaelyn Slupe <i>Menomonie, WI – Class of 2021</i> STEPS 2015
Halle Maki-Waller <i>Northfield, MN – Class of 2021</i> STEPS 2015	Fiona Wallace <i>Whitefish Bay, WI - Class of 2021</i> STEPS 2015

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Course Lead Instructors

Each STEPS course was led by professional, instructional staff. This staff included UW-Stout faculty and industry leaders. Five of the courses were taught by industry volunteers from 7 different companies. STEPS strives to have a high percentage of instructional staff as women. The percentage of women involved in the STEPS staff remained strong at over 90%.

Professional Volunteers

For many years, the STEPS program has had the honor and privilege of working with women industry professionals as volunteer instructors in the program. Some of our volunteer instructors are even alumni of the program (two women from our packaging team attended the inaugural STEPS program in 1997). In 2017, we initiated a more extensive volunteer program. The STEPS Industry Volunteer Program brings women from various technology companies to participate in STEPS as lab assistants. The volunteer lab assistants had the option of coming for either a ½ or full day to interact with our campers. They typically spent time in two different classes and interacted with at least 2 groups of campers. Many of the volunteers also enjoyed lunch with our campers. This program remained highly successful and provided an additional opportunity for campers to learn more about STEM fields from women leaders in industry. Nearly 70 women, from 23 different organizations participated in this program (this is an increase for our initial year which had 23 women from 6 organizations). We were extremely pleased with the outpouring of volunteerism from the many companies involved in supporting the STEPS program.

STEPS SPONSORS

STEPS cannot operate without the generous support of our donors. STEPS sponsors include corporate, public and private donations and grants. Our support base grew this past year with new corporate and private support along with long-term donors. Donations were received for direct camper support (covering registration fees), operational expenses, employee time and supplies. Our ongoing donation process enables STEPS to keep registration fees low for families. The camp registration fee is less than ½ of the total cost per camper. Campers certainly appreciated the generosity of our donors. Every camper wrote a thank you letter to a donor expressing their gratitude and sharing their experience. The thank you letters were sent to donors on the camper's behalf and included a weekly group picture.

FAMILY LEVEL SPONSORS

- UW Stout
- 3M
- Hampton Family Trust
- Xcel Energy

CHAMPION LEVEL SPONSORS

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- Andersen Windows
- SC Johnson
- Barbara Cushman Blue Fund
- Dean Neuburger
- Nordson Foundation

PARTNER LEVEL SPONSORS

- Ann Marie Foundation
- McNally Industries
- Graco

SPONSOR LEVEL SPONSORS

- Polaris
- Cardinal FG
- Dunn Energy Cooperative
- Nexen
- Jennerjahn Family
- Education Foundation of Birchwood
- Menomonie Lions
- Community Foundation of Dunn County (Charlotte Lee Charitable Fund)
- OEM Fabricators
- Bosch

FRIEND LEVEL SPONSORS

- American Legion of Birchwood
- Bosch Packaging Technology, Inc.
- Great Northern Corporation
- Nordson EDI
- Ellen Carlson
- Pember Construction
- AAUW
- Brian Finder

GIFTS IN KIND (includes supplies and volunteer time)

- 3M
- Andersen Windows
- Cardinal Glass
- EcoLab
- Geox
- International Paper
- Land-o-Lakes

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- Minnesota Wire
- Phillips Medicize
- Nordson EDI
- Prent Thermoforming
- Target Corporation
- Teel Plastics
- Thomson Reuters
- Urec
- Stoutfitters
- Advanced Moldings Technologies
- Jamf
- Measured Progress
- BW Systems
- ConAgra Foods
- OEM
- UW Stout
- GNC
- SC Johnson
- Xcel Energy

SUMMARY

The 2019 STEPS for Girls program was highly successful. We saw many impactful changes throughout the year that enhanced the experience of our campers. We are thankful to the staff for their dedication and efforts for our campers and we are extremely grateful to our volunteers and donors without whom none of this would be possible. We look forward to camp 2020 and are excited for the opportunities another year of STEPS will bring.

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APPENDIX A

Details of Camp Activities

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The STEPS activities spanned the entire week. Activities that provided parts and sub-assemblies to the final assembly activity began early in the week, providing enough time to make any necessary adjustments for proper operation of every campers' bug bot. Company tours and foundational science and math classes occurred mid-week. Campers navigated their bug bots through a variety of obstacle activities on Thursday afternoon. Through the week, evening recreational activities occurred, campers could do some shopping at the university bookstore, campers completed satisfaction surveys and the week ended with family invited graduation ceremony.

All classroom activities described below are roughly in the order in which they occurred during the week. Short descriptions of each activity are included along with the course lead instructor(s).

Plastics: (Monday)

Instructor: John Schultz, Engineering Technology, UW-Stout
Wendy Sary, Strategic Account Manager, Phillips Medizize

Each session began with self-introductions of staff and campers. All stated their name, hometown, and something interesting about themselves. There were plastics processing, packaging, and mechanical engineering industry professionals throughout the camp. The professionals explained their career paths and job responsibilities to the girls. Professionals helped the campers with their lab experiences or spent time with them in the labs. It was special to have these dedicated professionals explain how women in STEM can do anything they set their minds to.

After introductions there was a 20-minute discussion/slideshow on plastics and the processes required to make BugBot parts. Also discussed were the differences between thermoplastic and thermoset plastics and lab safety. The Lab Assistants did this presentation the last week.

Out in the lab the girls put on nitrile gloves and mixed equal quantities of Part A and Part B polyurethane foaming liquid in a cup and poured it into a foot mold. Lab Assistants prepared the materials for this lab prior to each group's arrival. The campers enjoyed watching their "foot" foam up three or four times the size of the mold. As the foam molds cured the campers were divided into two groups; one with 4 and the other 6. Each group was directed to different activities using thermoplastic materials: injection molding, thermoforming, or thermoforming the BugBot shell.

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Campers were given a brief demonstration on how to safely perform each activity. The shells for the BugBot were created on a semi-automatic thermoforming machine. A flat sheet of polystyrene was heated then formed tightly over a mold using vacuum. The shells were then trimmed using a paper cutter followed by a specially designed trimming fixture. A hole was drilled in the top to be used in the assembly operation.

The second thermoforming process was completed on a manual thermoforming machine. The girls had to keep an eye on the sheet to assure it was heated properly, crank a large handwheel to raise the mold into the heated sheet, then turn on the vacuum to form a part. They made an assortment of shapes including clown faces, a music note, fish, football helmet, or a sun flower. These souvenirs, as well as the foamed feet, went home with the campers.

The remaining activity performed in the plastics class was injection molding. This process involved inserting the desired mold into the machine and tightening the clamp. After the safety gate was closed the campers pushed a lever forward to activate the plunger that forced molten plastic into the mold cavity. After approximately 20 seconds the lever was returned to its original position, the clamp loosened, and the mold removed from the machine to extract the part. Each girl created an insert molded spare tire holder which was returned to the girls during assembly of their BugBots. The girls also had the opportunity to make a small screw driver, key chain fobs of Snoopy, Fred Flintstone, the UW-Stout bell tower, or random purge blobs (which were again a big hit!) Each camper was given beaded chain to attach to their key fobs.

Foundry: (Monday, Tuesday)

Instructor: Brian Finder, *Professor, Operations and Management Department, UW-Stout*

In this two-hour lab, the campers were introduced to the process of metal casting. During the first few minutes of the lab, the campers were acquainted with the process of casting where a liquid is poured into a mold, and over time (due to the addition/removal of heat or through chemical reaction) the liquid turns into a solid and therefore assumes the shape of the mold. The campers were asked to come up with examples of casting processes, and responses involving the making of ice, Jell-O, bread/muffins, candles, suckers, chocolate bars were often discussed. A Cuttlefish bone was introduced as a mold that was used approximately 1,500 years ago in order to cast precious metals. A 3D printed mold was also introduced to the students in order to highlight to evolution of the mold-making process. Various aspects of casting that relate to the use of cores and inserts were also presented. The discussion then shifted to the concept of expendable pattern casting with the use of polystyrene foam.

During the ensuing foam pattern development phase of the lab, the campers' initial goal was to fabricate the skid-plate assembly for their robot. In order to accomplish this goal, they first developed a blank foam pattern for their casting from a long strip of pre-cut foam using a specially-designed jig which possessed a stationary hot wire cutter. After each camper cut off a slice of the pre-cut foam using hot wire cutting tool, a triangular-shaped sprue was also cut with

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the same device. The pattern was then inserted into a coring device and a 1/2" diameter hole was cut into the side of the pattern along with the punching of two small holes along an adjoining edge of the pattern. The 1/2" hole was eventually filled with slightly dampened green sand and the two small holes permitted the insertion of a wire skid-plate. The campers were taught how to use a power engraver in order to engrave their initials on two thumbtacks. To construct the wire skid-plate, the campers first cut a piece of scrap stainless steel wire to a specified length and then beveled each end with a modified hand grinder. Each end of the beveled wire was cooled in a small container of water in order to prevent the campers from being burned as a result of the heat that was generated due to the grinding process. The length of wire was then mounted in a tool which utilized three different handle-based devices which allowed the camper to bend the wire in the shape of a small sock. The ends of this bent piece of wire were then inserted into the two previously made holes along the side of the foam pattern and a small hand-tool was used to gauge the correct gap between the edge of the pattern and the toe-portion of the bent wire. A total of four hot-melt glue guns were made available for the campers to facilitate adhering the pre-made foam sprue to the flat edge of the pattern, and the thumb tacks were also glued to an adjacent edge of the pattern.

The girls invested the patterns in a flask (i.e., a 46 oz. juice can) and covered them with dry olivine sand. Meanwhile, aluminum was being melted in the electrical induction furnace. As time permitted, each camper was allowed to observe the progress of the melt in the crucible, the sampling of its temperature, and the skimming of impurities from the top surface of the molten aluminum. Once the temperature had reached the required level (approx. 1,600 degrees F.), each camper was allowed to pour the molten aluminum through the use of an insulated cup which the instructor initially poured molten aluminum into. After the molds had cooled for approximately 5 minutes, the campers donned gloves and then were then allowed to dispense the contents of the flask on to a standard riddle which was situated above a small barrel. Each camper was then allowed to grip the hot casting with a pair of tongs and then transfer such into an adjoining water tank water for quenching. Final cutting and sanding of the castings was performed in the foundry's finishing room by the lab assistants and the finished castings were eventually transferred to the production lab for eventual assembly into the robot.

During the last one-half hour of the class, the campers were provided with a second polystyrene pattern that was Wisconsin-shaped and had UW-STOUT hand-embossed on one side. The campers were allowed to emboss their names / designs on the back of the Wisconsin-shaped pattern. The campers then were instructed to return into the foundry lab in order invest their Wisconsin-shaped patterns into the olivine sand and after the completion of this activity, the instructor poured the molten aluminum into each of sand and pattern-containing flasks. The campers were then allowed to take part in the casting shakeout, quenching, as well as the powered cutting and sanding steps of the keychain trinket finishing process. As time permitted, the instructor also presented the computer software that visually simulated how the metal would most likely flow into the Wisconsin-shaped pattern.

Packaging: (Monday)

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Instructors: Brianne Hartung Maier (wks 3 & 4), *Packaging Engineer, Land 'O Lakes*
Jenny Luepke Brownell (wk 3), *Senior Packaging Engineer, Target*
Emily Pribnow (wk 1), *Packaging Engineer, Ecolab*
Amy Lee (wk 2), *Packaging Engineer, Ecolab*
Deanna Kazy-Garey (wk 2) *Packaging Engineer, Ecolab*
Allison Nelson (wk 1) *Packaging Engineer, Ecolab*

In Packaging, the girls were introduced to packaging materials such as plastic, paper, aluminum/metals, glass and corrugated, and styles (bottles, pails, cartons, cans, etc.). The girls were also introduced to the four main functions of packaging; to protect, to contain, to communicate, and to perform. We discussed packages that they have seen in stores and how these packages meet these four main functions. To understand the four functions of a package the girls produced and preformed a commercial with a packaged and highlighted the four main functions of packaging.

The second activity that the girls participated in during class was an egg drop competition. The goal was to create a package that would protect their egg from a 25-foot drop. The girls were put in groups of two and started working on their package designs. They were given a short amount of time and materials to complete this task. A lot of fun was had by all as teams cheered each other on and eggs were deemed intact or scrambled.

Once the egg drop competition was complete, we began discussing the “bug bot” houses they were going to create and decorate in class. The houses would be used to store and transport their individual “bug bot” and its accessories. The container was in the shape of a house with supports in the bottom to fit the “bug bot” body and a carrying handle at the top. The pre-cut “bug bot” house blanks were cut using a large production cutting die at the corrugated vendor location. We explained why this is preferred when cutting large quantities of a design over cutting the “bug bot” houses by hand. During some weeks, the girls were able to see how corrugated board is made, cut on a rotary cutting die and printed while watching a video from the Discovery Channel TV show, “How It’s Made”

Electronics: (Monday, Tuesday)

Instructor: Sarah Hartjes, *Quotation Manager, Minnesota Wire*

The lab began with a brief introduction and soldering safety procedures. We also covered the difference between the wire and solder, and a quick overview of the tasks they would be performing throughout the lab.

Most lab assistants twisted the wires for the splices ahead of time; this way the girls got to begin soldering the splices right away. Once they were done soldering, they went to the heat shrink station to protect their splices. They came back to their station and started laying out their switches and hand fastening their wires to the switches. The girls were instructed to make hooks in their stripped wires and to pinch them onto the switches. This held the harness in place for

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soldering. One girl would build on the jig and the other girl would build on the table, using the examples. The lab assistants gave the girls a demonstration on how to solder their tabs, and reiterated the importance of not melting their switches. (But it was ok if they did. We had more.) Once they were done soldering their harness, they went to the testing station. They hooked up their harness to the test fixture. If they correct lights were illuminated with the correct switch actions, it was considered a successful build and it was packaged up for the manufacturing lab.

For the girls who finished their assemblies quickly, we taught them how to cut, strip and crimp wires. This allowed them to help out their fellow teams and learn their importance to cutting and stripping to the correct lengths. Some of them learned what happens if their wires are cut too short or stripped incorrectly.

Once most of the girls were done, I took out my bug bot and showed them what the wire harness looked like assembled and how it would. I walked it around to each girl to feel the bugs foot rotating and reversing with the switch action. Most were pretty amazed at what they had just accomplished. The total time was right about an hour – an hour, 15 minutes. Our times were sped up this year with the lab assistants twisting the splices.

One great thing that happened this year, was one of the lab assistants wrote manufacturing instructions for the electronics class. This will be a great assist in training future lab assistants.

Automation: (Monday)

Instructor: Mindy Allee, *CNC Machinist, Nordson, EDI*

In this session, campers learned about automation and, more specifically, how it relates to machining in industry. During the first 20 minutes of the lab, the girls were gathered in the classroom to view a presentation on basic automation and machining concepts. The presentation helped to acquaint the campers with the process of machining and how it has progressed to a semi-automated state. First, there was an introduction from each student and the instructor. The next slide was a simple definition what automation is, and a discussion about some examples out in the world. They learned some of the most common types of CNC machines are and what CNC stands for. CNC Machining is a type of automation along with the simple antenna machines with automation in the process. Students learned about manual machining equipment and how it has transformed into the more commonly seen automated CNC equipment that most shops use today, even though the basic underlying standard procedures of machining remain. Subsequently, the girls learned about how to communicate with CNCs through the use of CADD (Computer Aided Design and Drafting) and CAM (Computer Aided Manufacturing) software. CADD allows the user to create a solid model that is an accurate visual representation of part, and CAM allows the user to create toolpaths from the CADD model. They learned that CAM is how we speak to the machine. Successively, the girls learned that the toolpaths created in CAM are translated into G-code, a form of machine language that can be read by CNC technology. The G-code that the

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CAM program configurations are then input into a CNC machine and used to make a part. They were shown a program and taught the basics on how it works in synchrony with the axis, and what the G-codes are telling the machine to do. The campers learned that toolpaths, which are programmed paths that the user defines to guide the CNC machine tool through the machining process of part, are vital to the outcome of a machined product. The toolpaths created must be accurate in order to achieve success in machining a part. They learned what the different color toolpaths mean and why tool length and size is critical. To clarify these concepts, the girls examined several parts that were drawn and toolpathed on a CADD/CAM software. The girls learned how this type of automation is used in the industry and where it fits in, from product idea to assembly. Lastly they were taught the basic PPE to wear around the machines and why safety is important. They were asked to wear safety glasses and avoid touching their eyes in the shop. Also there was a reminder to wash hands. This concluded the in-classroom portion of the two-hour lab, and the girls were split into two groups of five to continue the session out in the machining lab.

One group of five participated in an activity to make antennas for their bug bots in an assembly line format. The bug bot antennas were made from welding wire, and jigs were provided to assist in properly bending the wire into the correct shape. Each girl was instructed to sit at a different assembly station and then learned and mastered that station through making 10 antennas, either the right or left sides, one for each of the 10 campers in that particular color group. The campers learned about assembly lines and utilizing jigs and fixtures to create identical parts in an efficient and timely manner. Upon completion of the antennas, the girls all agreed that working together in an assembly line to create 10 antennas was much faster than it would have been to create each

antenna as a whole personally. They learned that assembly lines can be automated to become a very powerful manufacturing tool.

The other group of five girls participated in a machining activity. In this activity, the girls would be engraving a STEPS foot and their name on a motor mount bracket for their bug bots. After machining, the bracket would be bent into the proper shape using a small press. The girls were then ready to begin creating their own personal G-code programs. They learned how to use the basic 2D CAM software that would be used to create their STEPS foot and name engraving G-code. The campers personalized their STEPS foot engraving, created the toolpaths required, and output the resulting G-code, which was saved on a USB flashdrive to be taken to the CNC machine. Each girl took her turn creating her own personal program. The campers were introduced to the CNC machine they would get to work on for that portion of the lab, a Milltronics RW-15 CNC vertical mill. The girls were shown the different components of the machine, including the control, table, and spindle. Subsequently, each girl took her turn operating the CNC mill. First, each girl loaded her piece of stock into the machine. Set up in the machine was a fixture specifically designed for the bug bot motor mount bracket that allowed the girls to take their parts in and out very quickly. After securing her part in place, each camper sprayed her part with coolant to help lubricate the tool in the machining process. Each camper's program was verified on the machine's control to ensure everything looked good in the program before running it. Upon verification success, each girl was then allowed to press start on the machine and watch her part be made inside the CNC mill. After machining, the girls were

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assisted in pressing the motor mount brackets into shape. This concluded the machining portion of the lab.

Additionally, if time permitted, the girls returned to the classroom to watch some miscellaneous videos on various machining techniques and automation ingenuities. The videos showed different machining concepts in action, including 5 and 6 axis machining, mill-turn machining, and utilizing CADD/CAM software to create and machine atypical materials or objects. The playlist of videos also contained material on automated systems, such as those utilized in the food processing and packaging industries. Overall, the videos covered a broad range of automation concepts that helped to give the campers a good overview of how the manufacturing industry is utilizing automated technology.

Robotics and New Technologies: (Tuesday)

Instructor: Kevin Olson, *Lab Manager, Communications Technology Department, UW-Stout*

After a short classroom session that introduced the campers to the purpose, capabilities and nature of robots and new technologies that are used by/within robots and how we control them with coding, the campers were split into 2 groups and rotated through each to work hands on with different forms of robotics.

The first group worked with the Mbots robotics kits and a lab assistant. While working with the robots campers learned how to make the robots move and how the use of different sensors help or allow the robot to move with more control and efficiently using block code programming. They also working on problem solving skills to program the robots much like their own bug bot will move and maneuver around when it bumps into objects.

The second group worked with the Sphero Sprk+ robot and a lab assistant. While working with this robot campers learned how to control the robot using block coding and the differences between the Mbot robot and Sphero Sprk+. The campers then used their knowledge, problem solving skills, and teamwork to maneuver their robot through a maze.

Fab Lab: (Tuesday)

Instructor: Mike Cropp, *Fab Lab Manager, Discovery Center Fab Lab, UW-Stout*

In this session, the campers were introduced to a Fab Lab. A general overview of what a Fab Lab is, what can be done, how it is done and who typically uses a Fab Lab was discussed for the first 10 minutes. We discussed how Fab Labs are a global network and about how we solve local problems. We then discussed our workflow from digital design to programming to machine,

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followed by slides with videos of how each process functions. The Fab Lab processes covered include: Laser engraver, 3D printer, Mini-mill, Vinyl Cutter, CNC Router and CNC Plasma.

After the introduction and tour, we divided the groups in half to perform some activities. The groups worked simultaneously on two laser engravers, switching activities when the first group was completed.

One activity was for each camper to manufacture a maze game. The game consisted of 5 layers of material: clear acrylic cover, wood maze pattern, wood hole pattern, wood catch chamber, and clear acrylic cover. The laser engraver was demonstrated, and the layers of the game were cut. Once the layers were cut, each camper removed the unneeded components and assembled the stack together. Each group discussed methods of how to hold the game together, usually with some failed experimentation. We end up using clear packaging tape wrapped around the assembled stack using a jig created on the equipment in the Fab Lab.

The other activity involved using a laser engraver to engrave the STEPS logo onto the base of a Bug Bot, and to create the base for a motor they finish in another session. The Bug Bot base utilizes a jig to align the part correctly in the machine. The motor base design is provided, but each camper customizes their name on the part. The parts are engraved and cut in batches on the laser and saved for the accompanying class.

Manufacturing- Robot Assembly: (Tuesday)

Instructor: Kari Berthiaume, *Advanced Manufacturing Manager*, Andersen Corporation
Amanda Losness, *Engineer II*, Andersen Corporation
Andrea Reissus, *Project Engineer*, Andersen Corporation

In the manufacturing lab, we began with a hands-on exercise to demonstrate lean manufacturing, safety, quality, delivery, continuous improvement and the customer experience. Conclusions were drawn that an assembly line would be more efficient than individual assembly. The campers solidified their conclusions through a pen building exercise in which one camper built pens, and was compared with many campers building pens in an assembly line. We discussed the importance of training, part presentation, and built-in quality checks. These topics were related to the assembly of the robots they would be building in the lab. The campers moved to the manufacturing lab and built their Bug Bots from the multiple parts created in previous modules. Quality control was discussed as each camper tested their Bug Bot before packaging it. The campers had a great time, gained first-hand experience in manufacturing, and experienced several key concepts in the manufacturing process.

There's STEM in What?!?! (Monday, Tuesday)

Industry professionals from a variety of disciplines volunteered their time to provide an engaging, hands-on presentation of a topic that involves STEM. Volunteers were asked to present on something that our campers may not realize had STEM implications. The goal of

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this class was to showcase the wide range of opportunities that having knowledge and interest in STEM fields can lead one towards. We had ten volunteers as part of this program from 5 different organizations. When we were unable to fill a time slot during the 4 weeks of camp, Kylie Anderson, Camp Assistant, presented on the opportunities that exist at UW-Stout and provided a chance for campers to ask questions about going to college. Below is a list of the presentation topics for “There’s STEM in *what?!?!?*”.

Cardiac Nursing
Music and Instruments
Architecture
Apparel Design
Physical Therapy
Feedback Processes
Project Management
Sports and Sport Equipment (cycling and curling)

Biology: (Wednesday)

Instructor: Ann Parsons, *Professor, Department of Biology, UW-Stout*

During this session, participants found out what bug bots and humans have in common. We compared the “nervous system” of the bug bots with our own nervous system, focusing on how the bug bots’ antennae serve as sensors, just like our bodies have sensors for sight, sound, touch, taste, and smell. An emphasis was placed on the concept that for each additional sensor a camper might add to their bug bot, they would also need to add more wires. Campers learned that the wires in their bug bots were like the axons of neurons in the human body and that each sensor in the human body has its own “wire”. Wow, that is a lot of axons! They are bundled into nerves and then go up or down the spinal cord to/from the brain. Participants needed to ask at least one question as they saw and touched a human spinal cord and got to hold a sheep and a human brain during a demonstration presented by the professor.

Physics: (Wednesday)

Instructors: Candace Corso, *Production Supervisor, 3M*
Amy Gagnon, *SQF Engineer, 3M*

In Physics, we discussed the concepts of electricity and magnetism and built a DC motor. The class started by posing the question “What is electricity?” We discussed protons, neutrons, and electrons and how they work in a DC motor. Then we shifted the conversation to magnetism and discussed the properties of magnets and magnetic materials. Students then explored the relationship between electricity and magnetism through a series of activities and demonstrations. First, we proved that we can use electricity to make a magnet. Then, we demonstrated that a magnet could be used to generate electricity.

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The campers then built a small DC motor using custom motor kits developed specifically for STEPS. This hands-on activity allowed the girls to learn more about the different components of a motor and how it works. The wood base was cut and engraved in the FABLAB activity. The campers completed their motors by assembling two paper clips on the base and crimping ring terminals onto the ends of the unfolded clips to serve as contacts and bearings for the armature. They wound a simple armature using a short length of copper magnet wire. The armature was installed in the ring terminals and a AA battery was placed between the paper clips to energize the motor. A rectangular ceramic magnet inserted in the base created a fixed magnetic field for the motor. The campers were able to take the finished motors home with them. We also discussed the application of motors and how the topic relates to their Bug Bots.

Mathematics: (Wednesday)

Instructor: Shing H. Lee, *Senior Lecturer, Department of Mathematics, Statistics, and Computer Science, UW-Stout*

Amy Leach, *Mathematics Specialist, Advance Ed / Measured Progress*

In the Math session, campers were grouped into four teams and their task was to measure the time bug bots traveling for 2 and 20 meters. The main purpose was to allow the campers to calculate the average (or mean) speed of a running bug bot.

Before beginning the timed trials of the bug bots, we discussed the concept of speed and how it relates to everyday life. We also discussed the units needed for speed in real life (miles per hour) and for the bug bots (meters per second).

The campers, in a group of two or three, used their bug bots to measure the running time over a 2-meter and a 20-meter course. For both courses, girls took turns for the following activities: one girl directed a bug bot from start to finish line, second girl used an App ‘Simple Screen Stopwatch’ in the tablet to measure the time of each run, and the third girl recorded the time on a worksheet. Campers conducted 3 trials and switched their tasks among directing the robot bug, using the stopwatch, and recording the time.

After measuring three runs over the 2-meter course, campers were back to the classroom to calculate the average run time of the bug bot for 2 meters. Moreover, campers also learned how to estimate the bot bug travel time for 20 meters. Campers also learned how to calculate average time and speed to one decimal place using a calculator. The calculation of average time of 2 meters (Sum of the times /Number of run) was also discussed. After campers completed the 2-meter course with bug bot, they went out to the hallway to measure the time for two more runs for the 20-meter course. For the 20-meter course, the lap function in the app was used to record the time for every 4 meters (4, 8, 12, 16 and 20 meters). After the completion of the 20-meter measurement, campers returned to classroom and calculated the average time the bug bot that traveled for 4, 8, 12, 16, and 20 meters. Campers completed a scatter plot on their handout and on the white board. The concept of calculating speed using the equation $Speed = \frac{Distance}{Time}$

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Time was introduced to calculate the average speed of the bug bot for the 20-meter distance. A table to show speed was created on a white board for each group to fill in their calculation results for comparison.

After both scatter plot and table were completed on the white board by each group, we discussed the patterns of the of the “linear function” from the scatter plot. The concept of the “slope” was applied to calculate for speed from the graph. We discussed the differences between their estimations on time calculations and the actual average run time of the robot bug for 20 meters. Reasons for the discrepancies between these two values and measurement errors were discussed

Chemistry: (Thursday)

Instructor: Matthew Ray, *Professor, Chemistry Department, UW-Stout*

The one-and-a-half-hour time block was divided into two 45- minute segments. In the first segment, a chemistry activity was introduced exploring batteries. We began with a discussion of how batteries were used to power the robots the campers made earlier in the week and how many other common electronic devices such as smart phone, laptops, etc., also used batteries. We discussed voltage, current, and resistance in a way that was easy to understand using analogies. The campers then formed groups of two and each camper received a copper electrode, zinc electrode, paper towel, and plastic vial and were instructed on how to assemble a “jelly roll” style battery using lemon juice as the electrolyte. After completing the batteries, the campers used laptops connected to data loggers to collect voltage and current data from their batteries. They then used their batteries to power various electronic devices and collected current and voltage data from the circuits they created. Devices such as stopwatches, alarm clocks, calculators, LED, a telegraph, handheld digital games, musical toys, etc. were all powered by the lemon batteries. To power the larger devices, camper groups formed larger teams and wired their batteries in series to generate higher and higher voltages until finally all 10 batteries were connected to form a “super battery” to power the devices with the largest voltage demand.

The second 45-minute segment was used to explore various energy and thermodynamics related topics in chemistry through demonstrations. Topic such as gas forming reactions, the fire triangle and fuel air ratios, spontaneous combustion of gummy bears, cryogenics (liquid nitrogen and oxygen), the ideal gas law, cloud formation, heavier-than-air vapors, and dust explosions were demonstrated and discussed.

Multi-media Communications: (Thursday)

Instructor: Rachel Hallgrimson, *Social Media Coordinator, University Communications, UW-Stout*

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In the Multimedia course, the campers learn about the five types of media, how to identify them in a variety of settings, and how multimedia can be a career or how it can supplement a STEM career.

For the first half of class, the campers will watch a video that contains all five types of multimedia. The class will discuss and define multimedia: the five types are as follows: text, audio, video, photos, and graphics. After that, the class will pick out all the ways the video used multimedia and we will discuss. After that, the campers learn about how multimedia tells a story and how stories are beneficial to helping people learn. The theme of “story” is used throughout the class. The campers then learn about how multimedia is beneficial for communicating complicated topics, helping people learn more efficiently and effectively, and how it can share important information.

The next big chunk of time, the campers will brainstorm and discuss different types of multimedia they personally interact with on a daily basis. This part exercises and strengthens their critical thinking abilities, and their ability to explain how multimedia works. After that, we talk about how powerful multimedia is and how we should use it to make the world a better place, especially helping communicate information from the STEM fields. For the rest of the time, campers will write down their 2 favorite things about STEPS camp. The instructor will use this information to create a piece of multimedia for each week’s campers to enjoy. The information goes into an interactive map, where the location of the ‘favorite things’ they wrote down will be geographically pinned to where they happened on the UW-Stout campus with a photo of that thing and the transcribed ‘favorite things.’ These maps are delivered to the students by link and QR codes on stickers made in the Graphic Communications course.

Bug Bot Games: (Thursday)

Instructors: Lab Assistants

During the Bug Bot games event, campers had the opportunity to personalize their bug bot through using decorations. Campers also watched their bug bots to maneuver through a fun obstacle course, go bowling, and play capture the flag.

To end the session, the STEPS participants wrote a letter to themselves, reflecting on their STEPS experience and what they wish themselves as future high school graduates. This letter was sealed and provided to their families at graduation. The STEPS staff requested that the participant families safe-keep the letter and provide it to the participants in 2020.

Graphic Communications (Thursday)

Instructor: Barbara Bear, *Graphic Communications Instructor, UW-Stout*

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Graphic Communications is a fast-paced industry full of creative people fabricating digital experiences and partnering interactivity with all forms of media. Our sessions, we discuss how data and graphics are related in multiple facets. We talk about primary imaging methods and the extensive range of opportunities for each student at UW-Stout. Students engage in lithography concept testing and see samples of flexographic, gravure, screen, inkjet and offset lithography print. The physics and chemistry of inks and print are briefly discussed with color and light concepts. Each student prints a bandanna with IR ink and a mirror with UV ink. An inkjet-printed label with a photo of their team, QR codes (to related web sites) and their personalized name labels are also take-home items.

Surveys: *(Sunday, Thursday)*

Facilitator: Meghan Walters, *Technology Education Teacher at Colby School District, STEPS Technical Director*

To track student participant perceptions regarding the disciplines of science, technology, engineering and mathematics (STEM) before and after the STEPS camp experience, a survey was conducted using the Qualtrics survey software. One UW-Stout computer labs were used to administer the survey instrument. Appendix B provides survey results.

Industry Tours: *(Wednesday)*

Industry tours were conducted on Wednesday afternoons by Phillips Medicize, where the campers saw real-world applications of the injection molding that they had done in the plastics activity, and Cardinal Glass, which provided a wonderful example of the use of automation on a large scale to produce sheets of window glass. Cardinal Glass also provided the campers to interact with as many female engineers and female production managers while on their tour.

Since our camp counselors participated in a leadership development program during the industry tours, community volunteers participated as chaperones for our campers. These included faculty and staff from UW-Stout, UW-Stout Foundation, Menomonie Lions and 3M.

Recreational Activities:

The campers were kept busy with either technical or recreational activities from the minute they woke up in the morning until lights out at 10 p.m. Recreational activities were scheduled in the evenings according to this schedule:

Ropes Course: (Sunday)

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A highly professional team from Stout Adventures conducted the Ropes course confidence, problem solving, and team building activity at the UW-Stout Ropes facility. The evening started out with several low ropes exercises by team after which the campers were allowed to negotiate the rock climbing wall, the Alpine tower, and the rope swing. This activity is a great ice breaker after which the campers know each other well.

Swimming: (Monday)

Campers were transported by bus to the Wakanda Park swimming pool in north Menomonie.

Pickleball: (Tuesday)

The fieldhouse at UW-Stout along with the pickleball courts at Wakanda were used to teach the campers the game of Pickle Ball. The lab assistants were instructing the campers on how to play pickleball and the origin of it.

Karaoke: (Wednesday)

After gathering in the Ballrooms in the Memorial Student center for a pizza party, the campers dance and sing to the music provided by DJ Bob Sachsenmaier.

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APPENDIX B

2019 STEPS Camp for Girls Camper/Junior Counselor Survey Report

EXECUTIVE SUMMARY

OVERVIEW

The STEPS (*Science, Technology, and Engineering Preview Summer*) Camp for Girls is held over four consecutive weeks during the summer on the University of Wisconsin-Stout campus. The camp holds four groups of girls between 6th and 7th grades, for a week at a time. High school aged girls are also brought on to serve as Junior Counselors for the camp. Campers are provided with an exciting introduction to the STEM fields (*Science, Technology, Engineering, and Math*).

METHODOLOGY

A pre-post survey was administered at the beginning and end of each week's session. Additional data was collected from the Junior Counselors. There was a total of 145 pre-post surveys completed by Campers and 16 surveys completed by the Junior Counselors. The authors believe the data supports the following conclusions:

College and Education

The number of campers who plan on attending college was consistently high between pre-post surveys (95%-94%). UW-Stout was the most popular school of choice in the post-survey for campers, and for counselors. *Applied Science* was the most popular choice in both the pre and post-surveys for intended college majors. There was a decrease in the number of participants reporting having no interest in pursuing college after the camp.

Career Plans

The STEPS Camp experience had a positive impact on campers' perceptions about working in STEM fields. Campers' perceptions of their presence in the field of *science* had a statistically significant increase from pre to post-survey. Their perceptions of the fields of *math* and *engineering* also increased. Junior Counselors strongly agreed that *it is okay* for them to work in all three fields. Campers also reported agreement that STEM courses prepare them for the future. There was a significant increase in agreement that STEM courses will help them attain a *better job* when they are adults, along with being *ready for college*. Junior counselors also shared the same views by reporting *agree* and *strongly agree* about STEM courses helping them *get a better job* and being *ready for college*.

Confidence and Interest in STEM Projects and Classes

Campers reported significant increases in their confidence in being successful in STEM related classes and activities. Questions included completing science and technology projects, using STEM related equipment, writing computer programs, and earning at least a "B" in STEM classes. Campers' interest in STEM related classes also had a significant increase, indicating that the STEPS camp impacts campers who attend. Junior Counselors' confidence and interest in



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STEM related classes and activities were all rated positively, with most average ratings approaching *very confident* and *very interested*.

Future Camp Involvement

At the beginning of each session, campers were asked how interested they would be in participating in camps like STEPS in the future. Most campers reported being *interested* or *very interested* in camps that are similar to STEPS. At the end of the week, campers were asked if they were interested in returning to STEPS as a Junior Counselor, Lab Assistant, or Counselor. Most campers reported that they were *interested* or *very interested*.

Experience with Staff

Overall, most campers reported that they were *always* treated with respect from camp staff. Junior Counselors and Lab Assistants were asked about their role preparation and overall experience. Most respondents felt they received enough information to be prepared for their position. While all Junior Counselors reported that their position was a valuable experience.

Technical and Recreational Activities

Campers were asked to report their favorite technical activity that they experienced during camp. *Chemistry* was reported most, with *Biology* and *Plastics* following. In addition, campers were asked to report their favorite recreational activities. The *Karaoke Party*, *Ropes Course*, and *Pickle Ball* were the top three choices.

Full Evaluation Report Available for Donors Upon Request