

IMPROVING RECRUITMENT AND TRAINING FOR 4-H STEM YOUTH
ROBOTICS PROGRAM VOLUNTEERS

by

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STATEMENT OF PERMISSION TO USE

In presenting this professional paper in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the MSSE Program shall make it available to borrowers under rules of the program.

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ABSTRACT

In this study, 4-H Volunteer Robotics Training workshops were evaluated for effectiveness. Using surveys, interviews and communication logs, this study examined the usefulness of the Robotics Volunteer Training workshops using LEGO Mindstorms kits and software. The findings from this study showed that a positive, supportive environment can help volunteers overcome past fears and negative feelings toward science and technology and to become successful leaders of youth robotics activities. The research also revealed that takes ongoing support and communication from 4-H staff after the training workshop, in order for the robotics volunteers to gain enough knowledge to lead a youth robotics activity. How can we create a positive robotics training experience for 4-H volunteers? Will an experiential learning experience help volunteers to gain confidence, competence and expertise that they need to be leaders for youth robotics activities? Will these trained volunteers be motivated to carry out a youth robotics activity beyond the training?

INTRODUCTION AND BACKGROUND

4-H is the largest youth development program in the United States. It is based in 109 land grant universities around the country as part of the Cooperative Extension Service. Caring adult volunteers, mentors and staff create clubs and programs for youth to develop skills in leadership, science, citizenship and healthy lifestyles. Goals of these programs are to guide youth in leading their own projects, setting goals and working cooperatively while developing confidence in their abilities (4-H, 2012).

Iowa State University Extension and Outreach (ISUEO) is Iowa's land grant university with offices in each of the state's 99 counties. Dallas County, Iowa is located in the center of the state near the capitol city of Des Moines. Dallas County Extension (DCE) is a branch of ISUEO. DCE 4-H volunteers help to create meaningful programs, clubs and activities for 4-H youth. These caring adult leaders lead students in projects, presentations, exhibits and ongoing investigations. The topics for the projects are as numerous as the youth members because these activities are based on the interests and curiosity of the members.

The focus for 4-H clubs in Iowa is to be more science, technology, engineering and mathematics (STEM) based. Iowa Governor's STEM Advisory Council states, "These disciplines are vital for thriving in the 21st century whether managing STEM-based decisions of daily life or pursuing STEM careers." (Advisory Council|STEM, 2012).

STEM is at the center of the 4-H mission in order to attract a more diverse urban audience to this youth development organization. 4-H clubs and programs appeal to a wider variety of youth because of the expanding the activities offered. In the past, 4-H

has been thought of only in the fair and farm arenas but today 4-H expands its reach into other areas.

One of the fastest growing areas of interest in the 4-H STEM topics is robotics. The 4-H club members and volunteers are interested in using LEGO Mindstorms kits to build and program robots. 4-H programs are led by volunteers, so STEM robotics activities would be guided by parents and other interested community members. Many of these adult volunteers have had negative STEM experiences in the past which makes them fearful of robotics and lack confidence when leading these 4-H STEM activities.

The purpose of the study is to improve adult 4-H Robotics volunteer training practices. The group of volunteers who are being trained to lead robotics youth activities have diverse interests and backgrounds. They are scientists, teachers, parents and interested community members.

The data collected will help 4-H staff create a supportive environment in which volunteers can gain confidence and knowledgeable environment for our 4-H STEM youth development programs, clubs and activities. The following guiding questions were used to help focus this capstone project:

- How can we create a positive robotics training experience for 4-H volunteers?
- Will an experiential learning experience help 4-H volunteers to gain confidence, competence and expertise that they need to be leaders for youth robotics programs, activities and clubs?
- Will the trained volunteers be motivated to carry out a youth robotics activity beyond the training?

CONCEPTUAL FRAMEWORK

Training volunteers is one of the most important components of quality 4-H science, technology, engineering and mathematics (STEM) programs. The staff and volunteers who work with the youth must be trained to gain confidence in order for the program to reach its full potential (Ripberger & Blaylock, 2011).

Recruitment of qualified and interested volunteers takes effort on the part of an organization's staff. Many things were considered in developing a volunteer training curriculum for health promotion programs in senior centers. Providing a list of benefits is an important component of volunteer recruitment. Having a job description for the volunteer roles and responsibilities helps individuals decide whether an assignment is a good fit. Individuals considering an unsalaried assignment should be allowed to view policies on the criteria and selection process for things such as background checks and training expectations (Schneider, Alpeter & Whitelaw, 2007).

Recruiting qualified science volunteers can prove difficult. Business and professional partners can supply needed STEM volunteer experts (Ripberger & Blalock, 2011). The National 4-H Council website offers ads, newsletter templates and public service announcements for 4-H staff to use when recruiting volunteers (Iowa 4-H: Volunteers, 2012). 4-H is a national youth development organization, and offers a science program promotional toolkit. In this toolkit, the organization suggests recruiting volunteers who are interested in working with youth as well as STEM content experts as leaders. As volunteers are recruited, it helps to cast a wide net in order to attract people with a variety of skills and an interest in youth development (Ripberger & Blalock, 2011). The Iowa 4-H website offers information for potential volunteers about

expectations, background checks, leader training dates and orientation videos to peruse before committing to a leadership assignment (Iowa 4-H: Volunteers, 2012).

When training volunteers, logistics should be a top consideration. Room location as well as arrangement, media requirements and even temperature are to be kept in mind for the overall comfort of participants. For older adult participants, these factors are top priorities when judging program satisfaction (Schneider et al., 2007).

Logistical considerations that give volunteers a field experience during the training process are key elements for authentic inquiry-based learning in an experiential setting. Businesses, tours and outdoor classrooms can serve as experiential training grounds because students are immersed in the learning setting. Inquiry-based learning is the student-centered cyclical process where students design investigations, do the scientific experiments, reflect on their learning and apply that knowledge to the world beyond the classroom. The Oregon 4-H Wildlife Stewards program takes teachers, volunteers and youth outside to the places where they are going to be studying science and environmental impact. This type of training venture serves as an excellent model for the budding science volunteer leaders, as well (Bourdeau & Arnold, 2008).

Implementing a training program for staff or volunteers takes careful preparation for the content and presentation of topics. In comparing the similarities in professional development (PD) between Institutions of Higher Education (IHE) and Informal Science Institutions (ISI), inquiry as a teaching strategy, effective inquiry-based instruction, teachers adapting material for their classrooms and teacher determination were shared traits. One outcome as a result of effective PD in ISI was that staff comfort with the science material determined the offering of content and course offerings. ISI were more

flexible regarding customization and focus of PD offerings and used hands-on tools for communicating science. This led to a better fit between PD providers and those taking the courses (Astor-Jack, McCallie & Balcerzak , 2007).

When setting staff and volunteers up for success, the Zoo On Wheels (ZOW) program and 4-H Science Promising Practices Guide offers examples of effective training procedures like checklists, clear-cut protocols, fact sheets, models, and curriculum and group management techniques. These are available for science leaders to use for presentations and outreach programs (Yordán, 2011; Ripberger & Blalock, 2011). Additional recommendations for training that came out of the ZOW program were to create databases of additional resources and information for science outreach educators to use as needed, establish yearly refresher courses, create evening trainings to practice presentation techniques and create videos of proper presentation techniques. All of these suggestions offer guidance for better training for science activity leaders to follow (Yordán, 2011).

A major challenge for 4-H Science programs is the lack of funding. Training staff and volunteers to deliver STEM content as well as to provide positive youth development programs is essential to 4-H program success. Overall, staff, volunteers and partners with 4-H are enthusiastic about STEM programming but it is difficult to find trainers with enough expertise to deliver specialized STEM training. Lack of funding and staff resources were the two factors that influenced the implementation of 4-H STEM programs. In a survey, 4-H staff and volunteers observed that a few opportunities for developing STEM knowledge and leadership skills existed for them in their state. (LaFleur, Sanzone, Butler & Mielke, 2010; Mielke, Butler & LaFleur, 2009).

Another aspect to address is the fear factor. When training STEM volunteers, program staff must make it clear that they do not need to be afraid of not having all the answers. Providing experiences and learning along with the youth are the hallmark of great facilitators. Along with curiosity, honing questioning skills is another task to master for STEM volunteers (Ripberger & Blalock, 2011).

The most important part of the STEM volunteer experience is probably the ongoing training and support that they receive after initial training. This can be in the form of volunteer recognition, feedback, group management techniques and continuous training opportunities. Support can also be offered in the form of program staff contact information, outreach for help in planning activities and help problems that arise (Ripberger & Blalock, 2011; Schneider et al., 2007).

Overall, having an effective volunteer and staff training program is essential for the success of any youth development program. This includes both formal and informal STEM education programs. It is important to put time, money and thoughtful effort into recruitment, planning, content and ongoing support.

METHODOLOGY

The purpose of this study was to improve 4-H Robotics volunteer training practices in a supportive environment to help volunteers feel confident and gain the knowledge needed to lead 4-H Robotics-focused STEM youth development programs, clubs and activities. 4-H Robotics activities were introduced in Dallas County, Iowa one year ago and it was necessary to determine which activities and information to include in our one-day 4-H Robotics volunteer leader training workshops. These workshops were

conducted to help our volunteers become confident and competent in using the LEGO Mindstorms robotics kits and software. Two 1-day robotics trainings were planned and volunteers could choose one to attend. There were two educators conducting each training session, Mary Kramer, Iowa 4-H Youth Program Specialist and myself. For the robotics volunteer training workshop, I used GEAR Tech 21 robotics curriculum (GT21) and 4-H Youth Development training methods. The GT21 curriculum modules gave us a foundation for learning how to build and program robots using the LEGO Mindstorms kits and 4-H Youth Development gave information on how to work with youth in grades K-12 (GEAR Tech 21, 2012; 4-H, 2012).

The Robotics Volunteer Pre-Training Survey and the Robotics Volunteer Post-Training Survey were given to volunteers in order to assess the effectiveness of the Robotics Volunteer Training (Appendices A & B). These questions assessed the participants' attitudes toward previous experience with science and robotics as well as comfort level and readiness to lead youth robotics activities. The surveys were scored using a Likert scale of *strongly agree*, *agree*, *neutral*, *disagree*, and *strongly disagree*. The pre and post-training survey answers were compared and the data were analyzed by comparing the percentage changes for each item to look for positive behavior change. The surveys indicated the comfort level with robotics, working with youth and confidence in leading a youth robotics activity. Training participants were asked in both surveys if they have additional information or comments to make and provided a space to write them down. These comments were compiled and recommendations for workshop improvement were made based on these responses. The research methodology for this

project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained.

During the training, volunteers were guided through the modules of GT21. Mary presented the modules and outlined tasks for our participants to complete before moving on to the next task. While she did that, I circulated and helped those who had questions and guided them through the problem-solving process one-on-one. Mary did the same when she was not giving whole group instruction.

Toward the end of the day, volunteers were given time to fill out the Robotics Activity Plan (Appendix C). The Robotics Activity Plan asked how they would use the robotics training with youth. It asked for a general timeline, what materials they would need and if they need further support and help from 4-H STEM staff. This instrument was used to determine volunteer follow through with their planned youth robotics activity. The volunteers were called and emailed and asked what youth robotics activity they had led. If they had not participated in a youth robotics activity, then they were asked to make another plan of action toward this goal. They were also asked if they needed more training or information in order to be able to complete this task. This plan also gave me concrete information to be able to assess what support each person needed from the 4-H staff.

To examine what types of activities and information were effective in 4-H robotics volunteer leader training, I used the Robotics Volunteer Post-Training Survey and Robotics Volunteer Post-Training Interview Questions (Appendices B & D). These data collection instruments asked open-ended questions that allowed the participants to give their own responses. Their answers were written in the Robotics Volunteer

Communication Log. This collected data helped determine what made the training effective and how we could improve the youth robotics training. Analyzing the responses of the open-ended questions from the post-survey and conducting interviews indicated to me whether the 4-H Youth Robotics Training had been a success for each volunteer, what further assistance each person still needed from me and what suggestions they had for future training workshops.

Using the Robotics Volunteer Post-Training Interview Questions as conversation starting points, I conducted face to face meetings, sent emails and made phone calls to the robotics volunteers to help with ongoing support and communication to assess the need for further interventions (Appendix D). The first question listed choices or the participant could use one of their own. In the analysis of this question, I determined the percentage of circled answers. The last two questions were open ended questions for the participants. These answers were used with other data to determine what had been helpful for the volunteers in this training and what to include in future robotics volunteer training workshops. I took the needs of this diverse audience into account when designing training experiences so our volunteers could gain the expertise, confidence and competence to work with youth (Riperger & Blalock, 2011).

Other data sources for this study included using trainee and educator reflections after the training. These were verbal comments made throughout the training day and in post-training conversations and were documented using the Robotics Training Communication Log (Appendix E). Space was provided on the Robotics Volunteer Post-Training Survey for volunteers to write what they thought about the training and asked to respond to what additional information and support is needed from the 4-H STEM staff.

Data Triangulation Matrix shows the data collection instruments that were used in this study (Table 1).

Table 1
Data Triangulation Matrix

Research Questions	Data Sources			
	1	2	3	4
How can we create a positive robotics training experience for 4-H volunteers?	Robotics Volunteer Pre- and Post-Training Surveys	Interviews	Educator Reflections and Observations	Educator Communication Logs
Will an experiential learning experience help volunteers gain confidence, competence and expertise that they need to be leaders for youth robotics activities?	Robotics Volunteer Pre- and Post-Training Surveys	Interviews	Volunteer reflections	Educator Communication Logs
Will these trained volunteers be motivated to carry out a youth robotics activity beyond the training?	Robotics Volunteer Pre- and Post-Training Surveys	Interviews	Data gathered from volunteers	Educator Communication Log

DATA AND ANALYSIS

Results of the Robotics Volunteer Pre-Training Survey and the Robotics Volunteer Post-Training Survey demonstrated that 64% of participants liked science and technology and post-training surveys yielded 86% of participants, a 22% increase ($N = 14$). When asked whether or not it was important for them to know about science and technology in their daily lives, the pre-training surveys indicated that 86% of participants indicated *agree* or *strongly agree*. After the training, 93% of the volunteers responded positively in the post-training survey, an increase of 7%. Participants' overall confidence in their science and technology skills and knowledge increased by 15% from pre and post-training surveys (Figure 1).

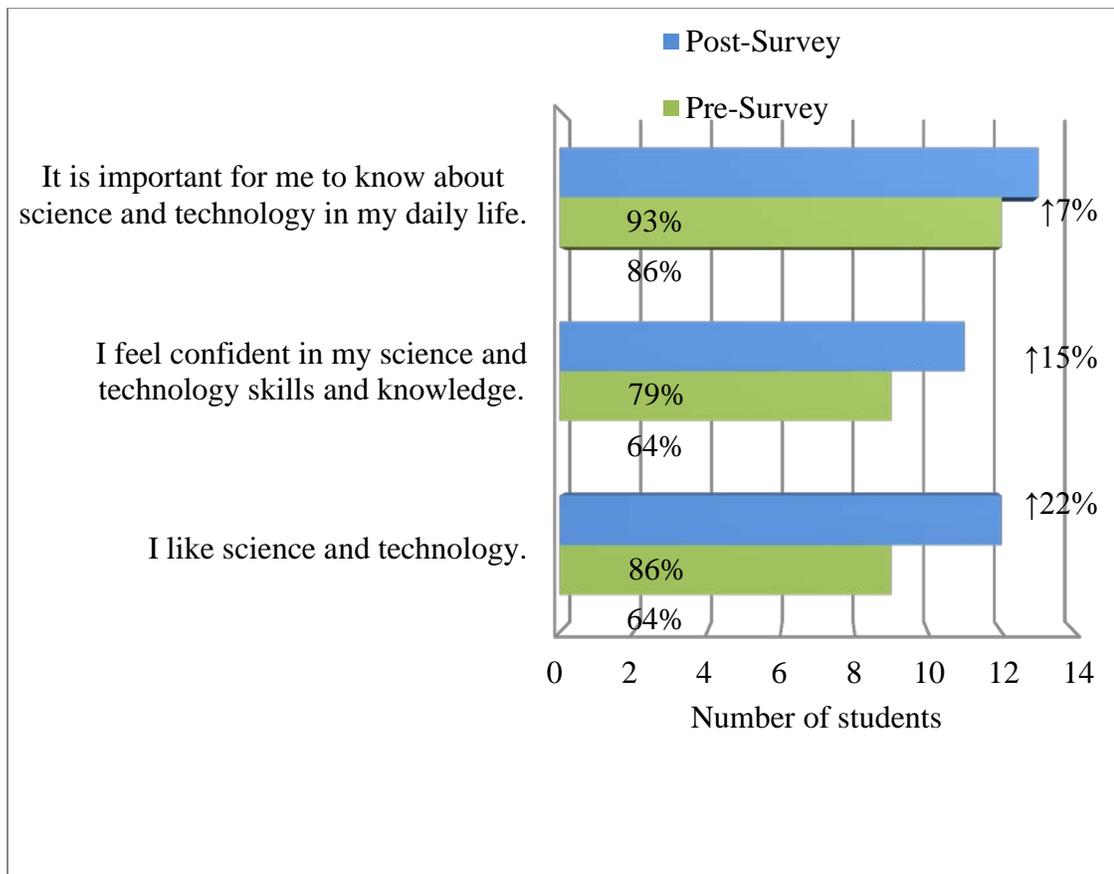


Figure 1. Comfort Levels, Confidence and Importance of Technology, ($N = 14$).

Volunteer confidence in leading a youth robotics activity before the training indicated that 64% of participants had the confidence to lead a robotics group and post-training surveys showed 100% of participants felt ready to lead a youth robotics activity, an increase of 36%. In the pre-training survey, 93% said that they could learn enough about robotics to teach it to others. After participation in the volunteer robotics training, 100% of the participants indicated that the training gave them the tools that they needed to lead a youth robotics activity as opposed to the pre-survey showing 43% of participants thought that the youth robotics volunteer training was what they needed to get started leading a youth robotics activity. After the training, one participant said, “What are my next steps? What paperwork do I need to fill out to become a 4-H volunteer and lead a robotics club?”

Responses from surveys, interviews and observations indicated that 100% of participants felt that the hands-on experience of assembling and programming the robot helped them to learn how to lead a youth robotics activity and 93% of volunteers noted that one-on-one help from the facilitators was a key to learning how to build and program the robot (Figure 2). In addition, 50% of trainees found the GEAR Tech 21 curriculum helpful in learning about robotics. Almost three-quarters of the training participants thought that the 4-H youth development information was a helpful addition to their training. The interviews revealed that 93% of participants followed through with planning and implementing a youth robotics activity.

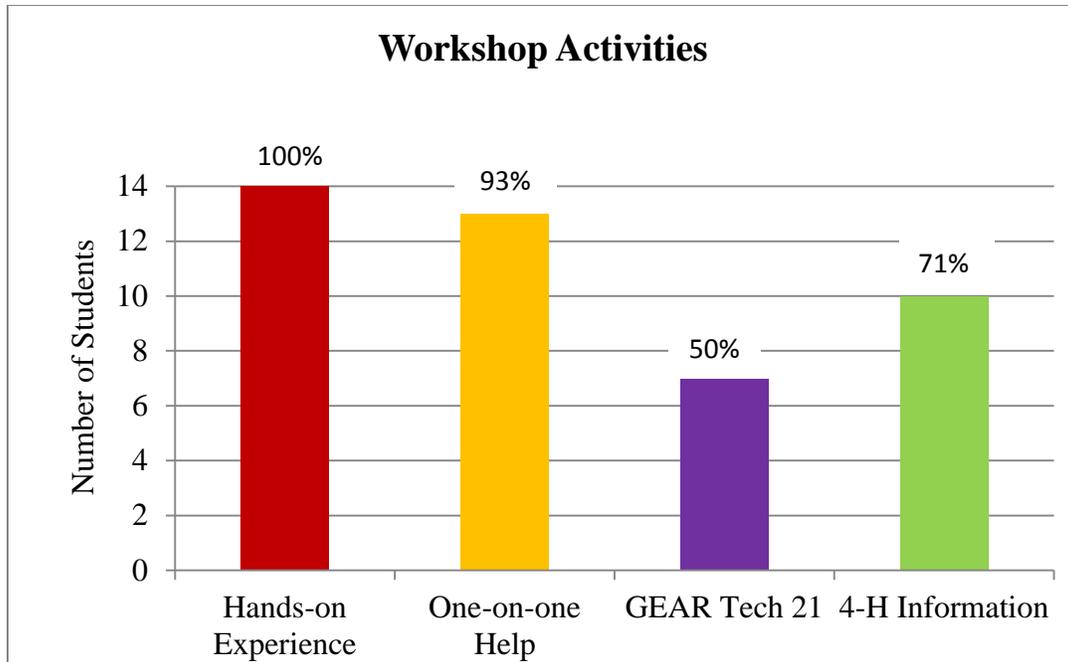


Figure 2. Workshop Activities That Created a Positive Experience for Volunteers, ($N = 14$).

Suggestions from volunteers for improving the robotics training workshops were compiled as possible changes for the next robotics volunteer training workshop. These comments included enlisting trained engineers to help volunteers with youth robotics activities and having more time during the training workshop to share ideas for activity implementation. When asked for suggestions to improve the training day, participants asked for more time and instruction on using robotic sensors as well as for sharing problem-solving strategies. Another person proposed making instructions clearer and adding information for working with special needs students with the LEGO Mindstorms kits. In an email conversation, one volunteer stated that, “I would've liked the robotics training to be clearer. As a learner, I would've done better if someone had said ‘first we'll make the robot move forward and to do this, do step a, b and c. Now we'll take a right turn, step a, b and c.’ And so on.” These participant observations were used to make recommendations for improving the workshop and the support of volunteers afterwards.

INTERPRETATION AND CONCLUSION

Results from this study indicated that a positive training experience can help those who do not feel confident with technology to feel competent enough to lead a youth robotics activity after the training. A hands-on experience with LEGO Mindstorms kits and software, working with others, 4-H Youth Development information and one-on-one attention from workshop staff were the strengths of the Robotics Volunteer Training workshops, as noted by the participant responses on the surveys, interviews and comments. Based on the data collected I have suggestions for improving robotics volunteer workshops (Table 2).

Table 2

4-H Robotics Volunteer Training Workshop Strengths and Recommendations for Improvement

Robotics Volunteer Training Workshop
<p>Strengths:</p> <ol style="list-style-type: none"> 2. Hands-on experience with LEGO Mindstorms kits and software 3. Working with others 4. 4-H Youth Development information 5. One-on-one attention from the workshop facilitators 6. Small workshop size
<p>Recommendations for Improvement:</p> <ul style="list-style-type: none"> • Make directions clear and understandable • Follow step by step process for explaining how to build and program the robot • Add information for working with learning differences in students • Add demonstrations of advanced programs for the participants to watch • Better training manual • More information for problem solving as it relates to building and programming the robot

Having a hands-on experience for volunteers helped them to become comfortable and familiar with the LEGO Robotics kits and software. Some participants need more

help and direction than others and the training allowed for those learning differences in individuals. The use of GT21 curriculum yields inconclusive results. It could have been the way I asked the question and it is possible that the volunteers did not understand what GT21 was and what was not. Either way, I have to ask if another method of delivering the hands-on experience would be the same as or more effective. Exploring other avenues that may make the robotics training even more effective for volunteers would be a good topic for future research.

This training made people more comfortable with STEM in general. Some people indicated either a bad experience with science in school, being uncomfortable with science and technology or both. As I travel around Iowa promoting 4-H STEM programs, my audience members often get a look of fear on their faces and mentally run screaming from the room when I mention science, technology, engineering and math. Hopefully, this positive training workshop experience translates into more support for STEM programming for their children, families and communities.

Follow-up support from 4-H staff is one of the most important aspects for volunteers because many of them are not comfortable with science and technology. In the literature, 4-H Science Volunteer best practices outline that the most important part of the STEM volunteer experience is probably the ongoing training and support that they receive after initial training. Volunteer recognition, feedback, group management techniques and continuous training opportunities are some of the ways that I can encourage and support volunteers (Ripberger, 2011). One workshop volunteer said,

“I thought the regular interaction and support from 4-H was great – as a new leader I needed that. Robotics and technology are far from my skill set so to lead

something like this was more intimidating than other activities I've been involved with.”

Recommendations for improving volunteer support after the training developed after analysis of the data.

Table 3
4-H Robotics Volunteer Training Follow-up Support Strengths and Recommendations for Improvement

Support After the Robotics Training
<p>Strengths:</p> <ul style="list-style-type: none"> • Phone calls, face-to-face meetings and emails helped to support volunteers to follow through with leading a youth robotics activity • Visits to other robotics clubs and programs
<p>Recommendations for Improvement:</p> <ul style="list-style-type: none"> • Clearer step-by-step process for leading the sequential robotics club activities • Pair robotics volunteers, clubs and programs with professional engineers who are experienced with engineering problem-solving

Although all volunteers followed through with leading at least one youth robotics activity, I would like to look at the quality and depth of those activities in the future.

Although I don't want to scare off a timid volunteer, it would be effective to know what kinds of activities are being conducted. The better I understand what is going on, the more I can figure out how best to support the volunteers' efforts.

VALUE

This capstone experience has had a transformative effect on my approach to training our volunteers in three ways. First, the participants in these trainings are volunteers. This fact alone constitutes handling them a little bit differently because they

could choose to do so many other things with their time. Acknowledging their efforts in the way of praise and gratitude and creating a fun atmosphere go a long way in holding onto their support.

The second realization was that pre and post-training assessments are vital for ongoing improvement and understanding of the effectiveness of my approaches. Although I have always used these assessments in the classroom, the need became even more important for me when teaching adult volunteers. These generous community members are donating their time and talent to learn about and support youth programs and development. By using pre and post-training surveys, I developed a deeper understanding of the volunteers as learners, how they feel about science and technology and their comfort level with robotics. I approached an engineer who states that he loves math and science differently than I would the stay-at-home mom who told me that she was uncomfortable with all this technology. As the surveys indicated, the smaller class size, one-on-one support and hands-on experience earned top points with our workshop participants. Having these data will also be a benefit as I work with my administration in seeking to conduct more robotics and STEM volunteer workshops.

Lastly, ongoing support is critical in order for our robotics volunteers to be successful. The interviews and comments from the workshop participants indicated that they appreciated and needed the support from 4-H staff in order to lead youth robotics activities. This was not just a one-time workshop but the beginning of ongoing relationships. One participant said, "Thanks so much for all of your help getting us started and being with us through the year and coordinating the high school kids to come help."

This capstone project has helped me to take a focused look at my teaching practices. Conducting this research has taught me how to gather and analyze data so I can articulate what is really happening in my classroom. By default, this helps me to let my stakeholders know what is happening in training workshops as well as communicating what I need in the way of funding and support.

My job as extension educator is tasked with promoting and teaching many different kinds of science, technology, engineering, math and environmental topics to both youth and adult learners. Robotics is a new and exciting field for us but there are so many other STEM interests in our communities. I plan to use what I have learned in this Montana State University program in those other areas in the future.

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APPENDICES

APPENDIX A

ROBOTICS VOLUNTEER PRE-TRAINING SURVEY

Appendix A

Robotics Volunteer Pre-Training Survey

The following statements will be read beforehand:

This survey is part of a research study being conducted by a graduate student of Montana State University and is being carried out also as part of Iowa State University Extension and Outreach, Dallas County program evaluation. By participating in this survey, you help us to improve our robotics training methods and this will not affect your relations with ISU Extension and Outreach or the Iowa 4-H program.

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Please be as honest as possible when answering the questions. If you do not know the answer to the question, please indicate accordingly. Your answers will only be accessed by members of the research team at Montana State University and by ISU Extension and Outreach youth staff.

The results of this survey will be used to gain a clearer understanding of the efficacy of the 4-H Robotics volunteer and staff training. By participating in this study, you could be helping the ISU Extension and Outreach, Dallas County train future robotics, science, technology, engineering and mathematics 4-H volunteers, thus creating more opportunities for Iowa youth to be involved in STEM activities. This study poses no additional risks to you other than those experienced in everyday life.

After reading the above, if you have any questions please e-mail me, the researcher: Cindy Watson Pottebaum (cindywp@iastate.edu). If you have any concerns and would like to reach someone other than the researcher, please contact Dr. John Graves (carl.graves@montana.edu).

You agree to give the researcher permission to use and disclose the anonymous results. The results from this survey will be used in a Master of Science in Science Education capstone project and may potentially be used as an article in a peer-reviewed educational journal.

Thank you very much for you participation!

Sincerely yours,

Cindy Watson Pottebaum

Montana State University graduate Student

Iowa State University Extension and Outreach

Extension Educator

Science, Technology, Engineering, Math and Environmental programs

Pre-training Survey

1. What is your occupation?
2. Gender: Female/Male
3. Are you a 4-H Leader? Yes / No
 - If YES, how many years have you been a 4-H leader?
 - If NO, are you a youth leader in another organization? Y/N
 - ✓ If Yes, which one?
4. Have you had any type of science, technology, engineering or math training?
Y/N
 - If Yes, please give details:
5. Have you had previous experience with LEGO Mindstorms robotics kits or software? Y/N
 - If Yes, what kind of experience have you had?
6. On average, how many times a year do you lead youth group activities? Please choose ONE.
 - None
 - 1-2 times a year
 - 3-4 times a year
 - 5-6 times a year
 - More than 6 times a year
7. What types of science, technology, engineering or math programs have you led?

10. Is there anything else that you would like us to know? Please feel free to comment here.

Please read the following statements and select one answer that best fits your situation:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. I like science and technology.					
12. This robotics training is what I need to get started leading a youth robotics activity.					
13. I feel confident in my science and technology skills and knowledge.					
14. Working on a computer is definitely the way I like to work.					
15. I have always liked science.					
16. I am confident about leading a youth robotics club.					
17. I have no experience with LEGO robotics.					
18. I am a hands-on learner and need to experience something in order to learn it.					

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19. I have had positive science and technology learning experiences in the past.					
20. I am a quick learner.					
21. I am confident about my ability to learn the robotics curriculum.					
22. I am unsure about leading a youth robotics club.					
23. I liked science class as a kid.					
24. I have experience with LEGO robotics.					
25. It is important for me to know about science and technology in my daily life.					
26. I can learn about robotics enough to teach it to others.					
27. Science and technology are too complicated for most people to learn.					
28. Science and technology are fun.					

APPENDIX B

ROBOTICS VOLUNTEER POST-TRAINING SURVEY

Appendix B

Robotics Volunteer Post-Training Survey

This statement will be read before participants take the survey:

This survey is part of a research study being conducted by a graduate student of Montana State University and is being carried out also as part of Iowa State University Extension and Outreach, Dallas County program evaluation. By participating in this survey, you help us to improve our robotics training methods and this will not affect your relations with ISU Extension and Outreach or the Iowa 4-H program.

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Please be as honest as possible when answering the questions. If you do not know the answer to the question, please indicate accordingly. Your answers will only be accessed by members of the research team at Montana State University and by ISU Extension and Outreach youth staff.

The results of this survey will be used to gain a clearer understanding of the efficacy of the 4-H Robotics volunteer and staff training. By participating in this study, you could be helping the ISU Extension and Outreach, Dallas County train future robotics, science, technology, engineering and mathematics 4-H volunteers, thus creating more opportunities for Iowa youth to be involved in STEM activities. This study poses no additional risks to you other than those experienced in everyday life.

After reading the above, if you have any questions please e-mail me, the researcher: Cindy Watson Pottebaum (cindywp@iastate.edu). If you have any concerns and would like to reach someone other than the researcher, please contact Dr. John Graves (carl.graves@montana.edu).

You agree to give the researcher permission to use and disclose the anonymous results. The results from this survey will be used in a Master of Science in Science Education capstone project and may potentially be used as an article in a peer-reviewed educational journal.

Thank you very much for you participation!

Sincerely,

Cindy Watson Pottebaum

Montana State University graduate Student

Iowa State University Extension and Outreach

Extension Educator

Science, Technology, Engineering, Math and Environmental programs

Post-Training Survey

1. What is your occupation?
2. Gender: Female/Male
3. Have you had previous experience with LEGO Mindstorms robotics kits or software? Y/N
4. On average, how many times a year do you lead youth group activities? Please choose ONE.
 - a. None
 - b. 1-2 times a year
 - c. 3-4 times a year
 - d. 5-6 times a year
 - e. More than 6 times a year
5. The parts of the training that helped me to learn how to lead a youth robotics activity were: Please select ALL that apply.
 - a. Assembling the robot
 - b. Programming the robot
 - c. Going through the GEAR Tech 21 curriculum
 - d. Youth Development information
 - e. Robotics Activity Plan
 - f. Other:

Comments:

6. Ways to improve this training:

*Please be as specific as possible.

7. What did not get covered in this training that needs to be included for next time?

8. Is there anything else that you would like us to know? Please feel free to comment here.

Please read the following statements and select one answer that best fits your situation:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9. I like science and technology.					
10. This robotics training is just what I've been waiting for.					
11. I feel confident in my science and technology skills and knowledge.					
12. After this training, I would like to assist with a youth robotics activity before leading one on my own.					
13. Working on a computer is definitely the way I like to work.					
14. I have always liked science.					
15. It helped to have the individual attention of the presenters when I had questions.					
16. I need more robotics training in order to lead a youth robotics activity.					
17. This training gave me the tools I need to lead a youth robotics activity.					
18. I am a quick learner.					

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19. I am confident about leading a youth robotics club.					
20. I am unsure about leading a robotics club.					
21. Today, I received enough training to feel confident about leading youth robotics activities.					
22. I feel confident about working with LEGO Mindstorms robotics.					
23. It is important for me to know about science and technology in my daily life.					
24. I learned enough about robotics to teach it to others.					
25. Science and technology are too complicated for most people to learn.					
26. Science and technology are fun.					
27. I would like to receive more training and support using the LEGO Mindstorms kits in order to lead a youth robotics activity.					

APPENDIX C

ROBOTICS ACTIVITY PLAN

Youth Robotics Action Plan

Name: _____

Idea for youth activity:

Timeline:

- One month from now: Month _____
- Two months from now: Month _____
- Three months from now: Month _____

Materials needed:

Support needed from me:

APPENDIX D

ROBOTICS VOLUNTEER POST-TRAINING INTERVIEW QUESTIONS

Robotics Post-Training Interview Questions

1. Thinking back on your robotics training, what helped you to feel ready to help with the robotics club? Please list all that apply.
 - Building and programming a robot
 - 4-H Youth Development information (Essential elements of a club, risk management, etc.)
 - GEAR Tech 21 curriculum and modules
 - Time to think about a plan to use the robotics
 - Watching and helping other volunteers in the training
 - other:
2. What would you suggest we change in order to make a better robotics training workshop?
3. What advice would you give to an adult volunteer who wants to lead a youth robotics activity?

Thank you for your time and help with making our 4-H Robotics Volunteer training a better program!

Cindy Watson Pottebaum

APPENDIX E

ROBOTICS VOLUNTEER COMMUNICATION LOG

