

**Always Be Prepared: Service Learning in Agricultural Mechanics**

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### **Introduction**

Service learning is an instructional methodology that benefits a students' technical skills, social and emotional learning (Zins, et al., 2007). Empirical evidence has shown that well-designed, well-implemented, school-based youth development initiatives can influence a diverse array of social, health, and academic outcomes (Greenberg et al., 2003). Service learning experiences have an integrated student learning focus with a fundamental community focus (Bringle, Clayton, & Hatcher, 2013). Agricultural education applies these concepts and adopted an experiential approach to learning since its inception (Baker, Robinson, & Kolb, 2012). Within agricultural education exists the opportunity to produce students who are well prepared for college and careers (Baker & Robinson, 2016). Innovative teaching practices are needed, especially in agricultural mechanics, to instill a culture of safety in students early in their academic career (Chumbley, Hainline & Wells, 2018; Saucier, McKim, & Tummons, 2012).

### **How It Works**

Guided by the Boy Scouts of America's welding merit badge guidelines (BSA, 2018) the Texas A&M University-Kingsville agricultural mechanics club offered a 3 hour welding workshop once a week for the local boy scout troops. The following learning objectives guided this service learning event:

1. *Name the different mechanical and thermal cutting methods. Choose one method and describe how to use the process. Discuss one advantage and one limitation of this process.*
2. *Do the following:*
  - a. *With your counselor, discuss general safety precautions and Material Safety Data Sheets related to welding. Explain the importance of the MSDS.*
  - b. *Describe the appropriate safety gear and clothing that must be worn when welding. Then, present yourself properly dressed for welding—in protective equipment, clothing, and footwear.*
  - c. *Explain and demonstrate the proper care and storage of welding equipment, tools, and protective clothing and footwear.*
3. *Do the following:*
  - a. *Select two welding processes, and make a list of the different components of the equipment required for each process. Discuss one advantage and one limitation for each process.*
  - b. *Choose one welding process. Have your counselor inspect and approve the area for the welding process you have chosen.*
4. *Use the equipment you prepared for the welding process to do the following:*
  - a. *Using a metal scribe or soapstone, sketch your initial onto a metal plate, and weld a bead on the plate following the pattern of your initial.*
  - b. *Cover a small plate (approximately 3" x 3" x 1/4") with weld beads side by side.*
  - c. *Tack two plates together in a square groove butt joint.*
  - d. *Weld the two plates together on both sides.*
  - e. *Tack two plates together in a T joint, have your counselor inspect it, then weld a T joint with fillet weld on both sides.*
5. *Do the following:*
  - a. *Find out about three career opportunities in the welding industry. Pick one and find out the education, training, and experience required for this profession.*
  - b. *Discuss the role of the American Welding Society in the welding profession. (Boy Scouts of America, 2018)*

During the Fall 2017 semester advertisement for these workshops was solicited with local BSA troops. Also during this time a designated undergraduate program leader worked with other TAMUK students to develop lessons for the workshop based off of BSA guidelines. During this

time those troops that wished to participate completed the necessary university liability waivers and the faculty project director took part in the BSA merit badge counselor training online.

During the Spring 2018 semester the 3-hour long workshops (5:30 pm- 8:30pm) were held once a week for five weeks. Students in the AGSC 1352 welding course also took part in the workshops, with extra credit as an incentive for participation. Each undergraduate student was paired with two boy scouts. Undergraduate participants consisted of primarily agricultural education and general agriculture majors. The BSA participants had to be 12 or older and have parent permission to participate. Parents were invited to participate alongside their child. Each workshop started with classroom instruction combined with a meal. This lasted 25-30 minutes with the remaining time dedicated hands-on learning in the lab. Each lab time started with a 5-10 minute safety briefing. All materials were prepped before the workshop by university students.

Following the BSA learning objectives, each workshop focused on different welding skills sets. Table one provides each weeks skill focus.

*Workshop Weekly Skills*

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Week One	Safety in the lab, mechanical (hydraulic iron worker) and thermal (plasma cutter) cutting
Week Two	Safety in SMAW, Performing a SMAW Butt Weld and laying a bead
Week Three	SMAW welds on plate & T-joint welds
Week Four	SMAW welds on plate & T-joint welds continued
Week Five	Using previous skills, construct foldable camp grill to take home

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**Results to Date**

We solicited participation from three local BSA troops. This resulted in 28 middle school aged participants each week. On average five of the parents stayed for each of the 3-hour workshops and an average 18 university students assisted at each of the five “boy scout nights”. These took place in late March, so that those in the welding class had enough instruction to feel comfortable assisting with the workshops. The BSA participants increased in their confidence each week, with many wishing that the project would continue beyond the 5-week model. All participants completed requirements for their merit badge. Parents were extremely pleased with the results of the project. Many of the university students expressed that their participation strengthened their understanding of welding and led to an increased appreciation for the skills necessary to teach agricultural mechanics.

**Future Plans**

Our intention is to continue this service learning project beginning mid-2018 fall semester with similar workshops geared towards the completion of the BSA woodworking merit badge with students in the AGSC 4353 Rural Construction course. It is advised that this project last mover than 5 weeks if possible and that training be given for university students at the beginning of the semester.

**Costs/Resources Needed**

Costs included workshop meals (\$930), lab consumables & PPE (\$2,250) and a stipend for undergraduate project leader (\$9 an hour @ 180 total hours). Total cost of this project was \$4,800 provided by a TAMUK service learning internal grant. This project required support from university administration for facility use.

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