Creation of a Sliding Ruler for Teaching Measurement in Agricultural Mechanics

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Agricultural mechanics is a staple of many agricultural education programs throughout the nation, and as such, pre-service and in-service teachers should be prepared to effectively deliver agricultural mechanics instruction (Burris, Robinson, & Terry, 2005). Multiple studies in the profession have examined the importance and abilities of SBAE teachers to teach subjects in Agricultural Mechanics, however, one fundamental skill to every area of Agricultural Mechanics is the ability to accurately read standard measurements. In their 2019 Delphi study, Hainline and Wells (2019) stated the identification and proper use of measuring/marking tools is an important agricultural mechanics knowledge and skills needed as identified by SBAE teachers in Iowa.

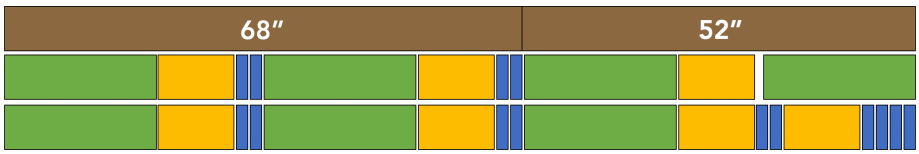
Historically, the use of visual aides to teach subject matter in agricultural mechanics has included PowerPoint slides, videos, pieces of realia, and simulations with food or other consumable materials. During the first week of their semester of student teaching, pre-service teachers at Oklahoma State University participate in a weeklong professional development seminar before entering their student teaching centers. Traditionally, the pre-service teachers participate in an agricultural mechanics project. In years past, the pre-service teachers built bird houses, toolboxes and other small projects that could be easily replicated in their student teaching centers. In addition to the small project, we decided it would also be beneficial to equip the pre-service teachers with an instructional visual aide to use in the classroom.

How it Works

The pre-service teachers were teamed up into groups of three to cut boards to length as described in the cost and resources section below and shown in Figure 1. Once cut, the pre-service teachers identified the center of the 20” side of the board which represented the ½” mark on a ruler. Next, the pre-service teachers measured out from center in one-inch increments which represented 1/16 inch. Using a speed square and permanent marker, pre-service teachers marked the individual lines at varying lengths as shown in Figure 2.

Figure 1

Cut Diagram for 10-foot board



Green = 20 inches
Yellow = 9 inches
Blue = 1 ½ inches

Figure 2

Length of Increment Lines

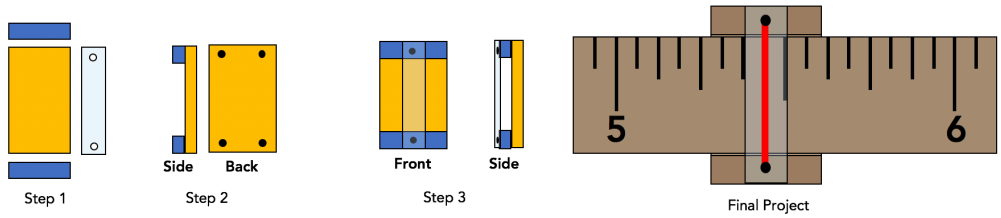
Orange - 3 ½ inch line = 1”
Green - 3-inch line = ½”
Yellow 2 ½ inch line = ¼

Gray - 1 ½ inch line = 1/16”
Blue - 2-inch line = 1/8”

Students then assembled a plexiglass slider to highlight measurements as shown in Figure 3. The slider allows teachers to indicate a measurement on the board as a visual aide to teach

measurements. The board can also be uses to ask students to identify the measurements for formative assessment.

Figure 3



Results to Date

The initial project was executed during the Spring 2020 student teacher seminar. Pre-service teachers used one 18-inch board to create an enlarged one-inch section of a tape measure. The pre-service teachers enjoyed the project and agreed the board would be a good resource to use in their classrooms. When asked about the project, one pre-service teacher said the ruler project was a really simple idea, but easily used as an assessment tool, for bell work, and to explain better why a cutting blade needed to be to the right of the line rather than directly on the line (personal communication, June 25, 2020). Another pre-service teacher said it was helpful in the classroom because "it was representative of the tape measure but on a much bigger scale and I could explain it to the entire class at once rather than have to go out and show them one at a time or in small groups"(personal communication, June 26, 2020).

Future Plans/Advice to Others

This project has already received great feedback and other idea implementation from the pre-service teachers s. Future plans include using both sides of the ruler for instructional purposes, including color coded increments and labeled increments. Our advice to others for this project is to buy lumber that is dry and not prone to shrinkage. The lumber purchased for this original project shrank after assembly and made the slider looser than preferred.

Cost and Resources

Equipment needed for this project include a cross cut saw for 1x6 lumber, table saw for plexiglass pieces, power drill with Philips head bit and drill bit for pre-drilling screw holes, speed square, pencil, black and red permanent markers. Consumable materials are shown in Table 1. When purchasing lumber for this project, we bought 1x6 boards that were ten feet in length. We found by cutting the 10-foot sections into 68-inch and 52-inch sections we could place students into groups of two and three.

Table 1. *Approximate Cost of Resources Used for Slide Ruler Project*

Material	Qty.	# of projects	Per project	Unit cost	Cost/project
1" x 6" x 10' board	2	7	1 (20", 9") 2 (1½")	$10.00	$2.86
30" x 36" plexiglass	1	60	2" x 9"	$36.00	$0.60
1" wood screws	1 box = 100 pieces	16	6 screws	$6.00	$0.38
Total					$3.84

Note. All 9" measurements should be 3 ¼" more than the width of 6-inch board

References

Burris, S., Robinson, J. S., & Terry Jr., R. (2005). Preparation of preservice teachers in agricultural mechanics. *Journal of Agricultural Education, 46*(3), 23–34. doi:10.5032/jae.2005.03023

Hainline, M. S., & Wells, T. (2019). Identifying the agricultural mechanics knowledge and skills needed by Iowa school-based agricultural education teachers. *Journal of Agricultural Education, 60*(1), 59-79 https://doi.org/10.5032/jae.2019.01059