Innovative Idea

# The "Big Inch": Helping Preservice Agricultural Educators Reengage with Mathematical Applications

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## Introduction/Need for Innovation

Preservice agricultural educators teaching agricultural mechanics classes are faced with a dilemma. Although they are expected to instruct students on the proper measurement of materials (National Council for Agricultural Education, 2015), mathematics and measuring are concepts many of them lack confidence in (Jansen & Thompson, 2008; Stripling & Roberts, 2012). Agricultural educators have been called on to integrate abstract mathematic concepts in a contextual manner (Myers & Dyer, 2004), which includes teaching fractions and the mathematical operations related to measuring. Preservice agricultural educators have noted the importance of teaching agricultural construction concepts, but noted a lower competency and confidence in teaching them (Joerger, 2002; Wingenbach, White, Degenhart, Pannkuk, & Kujawski, 2007).

Developing student competency using measuring tools is important to an agricultural mechanics program. Understanding proper measuring has applied importance; it can reduce the time required for a specific project, minimize the amount of mistakes made, and ultimately save money on the waste created by measuring errors (Lamon, 2012). In addition, there is mathematical importance for students learning measurement; students learn to associate distance with mathematical operations, can perform basic fraction calculations, and can translate the contextualized information to abstract mathematic problems (Lamon, 2012). As a basic construction concept, student understanding of measurement is an important foundation to use when scaffolding agricultural construction lessons. Giving student teachers the tools needed to instruct this foundational component allows them to remediate student knowledge in this area prior to moving on to more advanced concepts.

Increasing student teacher confidence can have a big impact on their performance (Darling-Hammond & Bransford, 2005). Increasing confidence in measuring abilities could have a noted impact on ability to teach measuring in agricultural mechanics courses. This project was designed to reinforce preservice teacher knowledge of measuring, and allow them to enter their student teaching experience with both an effective plan for teaching measurement, and a teaching aide to assist student understanding.

## How it Works

The Big Inch has been used as an introductory project in the agricultural mechanics teaching class at [University] for two semesters. The parameters of the project are as follows:

Students create an exaggerated inch from a twenty inch section of 1 x 4 poplar. The section is broken up into sixteenths, as if it was an inch on a ruler, tape measure, or other standard measurement tool. Marks are on a 20:1 scale, for example, $^{1}/_{16}$" is shown on the Big

Inch at 1 ¼". The different increments of measurement are represented by different length lines on the Big Inch, comparable to the marks on a tape measure, ruler, or other standard measuring device. Sixteenths are represented by a line a half inch long, eighths are represented by a line one inch long, fourths are represented by a line one and a half inches long, and the half inch mark is two inches long. When completed, the Big Inch is easily visible from a distance, making it an excellent tool for student teachers to use in their classes.

## Results to Date/Implications

In the last two semesters, 41 agricultural education students have completed the Big Inch assignment. As future agriculture science teachers, students have been very receptive to the project and have shared the impact on their current and future teaching. On evaluation of the project, one student wrote "I personally struggle with measurements between 1/16th, 1/8th, and so on. This was a great visual and hands-on representation of how to do measurements while using tools in the shop to do so". Another student commented "I thought it helped me make sense of the measurements, and it presented the information in a way that I had never seen it. I plan on taking it with me to teach high school". Several other students mentioned their desire to teach the Big Inch lesson with their high school students.

## Future Plans

The success of this project and requests from student teachers has led us to planning an extension it to high school educators. We intend on developing a complete lesson plan and objectives that can be used by agricultural science teachers at the high school level. The lesson plan will be complete with objectives, step-by-step directions, a job sheet, and a scoring rubric. Once the lesson plan has been developed, it will be available for agriculture educators online.

We also plan to suggest the project as a community service project for the FFA chapter. Once the class has completed their projects, they will be paired with a local elementary school teacher and donate their Big Inch to their respective teacher. The receiving teacher can then use this as a teaching instrument in their classroom. Additionally, we plan to create an accompanying third-grade lesson plan that would be given to the teachers along with the project itself.

## Costs/Resources Needed

There are minimal costs involved in creating The Big Inch. A miter saw is needed to make the cuts and the raw poplar can be purchased in 8 foot sections (which will make four completed Big Inches) for around $15. The assignment can be completed with post-secondary students in less than two hours of lab time.

## References


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