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## Wooden Planks: A Tool for Youth Science, Technology, Engineering, and Math Exploration

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## **Wooden Planks: A Tool for Youth Science, Technology, Engineering, and Math Exploration**

### **Abstract**

Wooden planks are a tool for developing youth skills through science, technology, engineering, and math exploration. These are small planks that can be stacked to create complex structures as youths explore math and physical relationships in an applied context. Building with wooden planks also cultivates planning, reasoning, and team skills as youths design and build structures. We developed an event in which adult and youth teams competed to build structures from wooden planks. Our Building Challenge proved to be effective in cultivating youth–adult engagement and expanding Extension's reach to new audiences while also raising funds for youth programs.

**Keywords:** [STEM](#), [teamwork](#), [youth–adult partnership](#), [wooden planks](#), [fundraising](#)

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Blocks are a traditional component of early childhood programs, used for providing a rich environment for exploring physical and mathematical concepts (e.g., mass, weight, area, number). Blocks also can be used for providing a natural context in which children can develop core competencies of cooperation as they build together and tolerance for frustration as structures topple (Hanline, Milton, & Phelps, 2001; Hansel, 2015; Shaklee & Demarest, 2018; Tepylo, Moss, & Stephenson, 2015; White, 2012).

Older youths appreciate hands-on exploration and can develop the same core competencies through wooden plank play. These planks are small hardwood blocks of uniform size ( $\frac{5}{16} \times \frac{15}{16} \times \frac{45}{8}$  inches) that can be arranged to create large complex structures. Building possibilities with wooden planks can be seen at [www.kevaplanks.com](http://www.kevaplanks.com) and [www.kaplaus.com](http://www.kaplaus.com).

Wooden planks provide a natural context for science, technology, engineering, and math (STEM) exploration, demonstrating geometric constructs (e.g., area and volume) and physical principles (e.g., balance and mass). Youths can plan and build structures alone or in teams, addressing engineering and architectural challenges throughout the process. Group building further strengthens competencies in teamwork, cooperation, and group decision making (Hendricks, 1998; Kersh, Casey, & Young, 2008; Nath & Szucs, 2014; Verdine et al., 2014). For these reasons, wooden plank activities fit well with existing STEM-related 4-

H programs (Barker, Nugent, & Grandgenett, 2008; Ewers, 2010; Riley & Butler, 2012; U.S. Department of Agriculture, National Institute of Food and Agriculture, 2011).

## Building Challenge

To test the potential of wooden planks as a program tool, we developed a team plank-building competition—the Building Challenge—and invited businesses and junior high and high schools to send three-person teams to participate. The event centered on goals and associated outcomes related to youth–adult engagement, outreach, and fund-raising.

- *Youth–adult engagement.* Our competition incorporated STEM-based businesses to enable meaningful contact between youths and adults in science-related occupations. Business teams competed first, and the youth competition followed—with plenty of time for each age group to admire the ingenuity of the other. Postcompetition conversation among competitors facilitated networking between youths and local professionals.
- *Outreach.* The Building Challenge was a high-profile event that resulted in newspaper, radio, and television coverage in the host community, likely expanding awareness of Extension among new audiences. Civic leaders, including the mayor, city council members, and television personalities, attended the event. The Building Challenge showcased the talents of community youths while allowing Extension to build bridges with professionals and civic leaders.
- *Fund-raising.* The Building Challenge was structured as a fund-raiser. Business sponsors paid \$500–\$1,500 to enter a team, either a trio of their own employees or youths representing a school. Winning teams received \$1,000 or \$500 (first or second prize) for the educational or youth program of their choice. Over the 2 years that the Building Challenge was conducted, 17 businesses sponsored 29 teams, resulting in a net income of \$7,500. In addition, entry fees funded the purchase of the wooden planks, which were subsequently used for state 4-H programming. Beyond fund-raising, the Building Challenge brought community leaders and businesses together with local youths to learn about the work of 4-H and Extension in STEM and youth development.

Through our experience, we identified several best practices for a competition event centered on the use of wooden planks. Others interested in hosting such an event may benefit from observing the following recommendations:

- Hold the event in an environment with elements that promote success, including a steady floor (minor tremors topple structures), adequate space for each team, and room for onlookers to see without interfering with builders.
- Ensure uniform conditions and building specifications for all teams. Each of our teams started its structure on a 6-by-6-in ceramic tile, and each team had the same number of planks. Teams were required to incorporate a potato figure into the structure (half of a potato with eyes and a mouth)—providing an opportunity for use of a program mascot and a bit of levity. Teams had 15 min to plan and 30 min to build their structures, which were measured promptly upon completion.

Develop and communicate clear judging criteria. We used the combined score derived from a structure's height (H), its width (W), and the distance from the structure's horizontal center to the placement of the potato figure (P) (i.e.,  $H \times W \times P$ ). Since structures can be fragile, the measurement process should not involve touching a structure (we used a laser measuring tool developed by university engineering students).

Our building competition proved to be exciting for both youth and adult participants (see Figures 1 and 2). Teams were challenged by the demanding building specifications and the need to employ engineering-inspired strategies, and were justifiably proud of the resultant structures. Enthusiastic onlookers, including fellow contestants, local leaders, and media, contributed to a festive atmosphere. There was always the risk of structures falling mid-build; in fact, a couple of spectacular creations collapsed just moments before completion. Finally, teams were proud to represent their schools and businesses and eager to bring prize money to their chosen youth or educational programs.

**Figure 1.**

Youth Team Laying Groundwork for Structure



**Figure 2.**

Adult Team Placing Final Blocks on Winning Design



## Conclusion

Wooden planks can be an ideal component of youth development programs, facilitating an opportunity for

youths to explore STEM concepts in a hands-on manner and cultivate thinking and problem-solving skills as they plan and build. The wooden planks we purchased through Building Challenge entry fees have been packaged into a block lending program with guided exploration activities, traveling to 4-H and other youth groups throughout Idaho. We also have used wooden planks for team competitions in informal settings. For example, at a state Extension conference, two-person teams built structures, with conference attendees voting for the most creative entry. Extension educators and others conducting youth afterschool or day-camp programs could similarly incorporate a competition model into their activities.

Our experience demonstrates the utility of wooden planks in youth development programming. Youths are thoroughly engaged in the building process, and many amazing structures result from their efforts. Wooden planks are nearly indestructible and are easily adapted to a variety of building environments. Most importantly, building activities can cultivate development of planning, reasoning, and team skills as youths explore core STEM concepts in an applied setting.

### **Author Note**

Diane Demarest is now the director of grant development at Jannus, Inc., Boise, Idaho.

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