

Assistive Technology for Rural Youth

Breaking New Ground Resource Center, Purdue University

National AgrAbility Project

Lesson 1

Sponsor
NEC
NEC Foundation of America

Tools, Technologies, and Innovative Work Practices in Agriculture

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Learning Objectives

As a result of this lesson, the learner will be able to:

1. Explain the role of tools, technology, and innovative work practices in making farmers and ranchers more productive.
2. Identify the ways that tools, technologies, and innovative work practices can benefit farmers and ranchers with disabilities.
3. Explain how a person's disability and the use of some assistive technologies can present special safety issues to those working in production agriculture.

Introduction (for the Instructor)

"Give me a place to stand and I will move the earth"
Archimedes

Archimedes understood that given the right tool (the lever), and a place to use it, he could accomplish some mighty big jobs. Every good agriculture student knows that it sometimes takes a longer ratchet, bigger crowbar, larger hammer, or some other special tool to get a job done. In agriculture, especially, tools are essential! Without the right tools, technologies, and innovative work practices, agricultural production would absorb most of the population as laborers, be a source of much drudgery, and result in greater loss of human life due to workplace hazards and the inability to produce enough food.

The purpose of Lesson 1 is to introduce the students to the important role that tools, technologies, and innovative work practices play in making farm and ranch worksites more accessible to persons with a variety of disabling conditions. It accomplishes this mission by reinforcing the importance of these "tools" in making American farmers and ranchers the most productive of the world's agricultural producers. Next, it reminds students that each of them uses tools, technologies, and innovative work practices to accomplish tasks that exceed their strength, endurance, or speed, or other physical abilities. In other words, even the strongest person without the right tools would be "disabled" or unable to perform certain tasks. Students are then introduced to the need that some individuals have for tools, technologies, or innovative work practices, due to physical limitations, such as those caused by injury, disease, or aging. Finally, the lesson addresses safety issues that can arise when accommodations are made to enable a person with a disability to perform farm and ranch-related tasks.

Lesson 1 builds the foundation for Lessons 2 and 3 and should be covered first. You are encouraged to read over all three lessons and view the PowerPoint presentations before presenting the material to the class.

Tools, Equipment, and Supplies



- ✓ Computer
- ✓ Screen
- ✓ LCD projector
- ✓ PowerPoint presentation – Lesson 1: **"Tools, Technologies, and Innovative Work Practices in Agriculture"**
- ✓ Toolbox containing common carpentry or mechanic tools
- ✓ Black, dry erase, smartboard



References

Breaking New Ground Resource Center, Purdue University, (2009). *The Toolbox CD: Agricultural Tools, Equipment, Machinery and Buildings for Farmers and Ranchers with Physical Disabilities*. 6th Ed. (Educator's Edition).

www.dictionary.com

Methods/Content

(NOTE: The locations of each slide on the PowerPoint presentation are shown by the PowerPoint icon on the side. In addition, instructors are encouraged to use black, dry erase, or smart boards to record students' responses to discussion questions.)

Objective 1

Explain the role of tools, technology, and innovative work practices in making farmers and ranchers more productive.



Today we are going to talk about the creative ways that farmers and ranchers have made their work easier to perform.

Can you imagine trying to raise crops using nothing but your body? Have you ever tried tilling the ground with just your hands or feet? How about removing weeds, insects, or diseased plants...using only your hands? If you did, then harvesting would require you to break off or tear loose the crops, remove the seed, grain, fruit, or juice...one plant at a time...using just your hands.

No one would dream of trying to complete these jobs this way. How have these tasks been made easier?

- Make note of the tools listed by the students on the black, dry erase, or smart board. Try to avoid using the term "tools" – just let the student supply the responses.



How about building a fence? Would there be things you could use or methods to speed the project up and make it an easier job?

- Once again make note of what the students say on the black, white, dry erase, or smart board. Perhaps show tools from a toolbox as examples. Remember, you are looking for both tools and work practices.



In general, what do we call these things you have identified to make work easier and, in some cases, possible? What is the term often used to describe all of these? (point to lists on the board)

- “Tools”, “technologies”, and “innovative work practices” are all appropriate responses. To simplify things in this and the remaining lessons, the term “tools” will be used.



Even the most primitive farmers in the world have developed tools to reduce drudgery and increase productivity. Can you imagine a world without tools?

On the following video, we are going to hear from a couple people who are going to talk a little about some specialized tools you might not have seen or heard of.



- Start the Lesson 1: “Tools, Technologies, and Innovative Work Practices in Agriculture” PowerPoint presentation.



- Play introductory video clip.



Now that Ed and Nellie Bell have shown us some of the tools used by people with and without disabilities, perhaps we should formally define what he was referring to.

- Read the definitions for “tool.”

Definitions

1. A device, such as a saw, used to perform or facilitate manual or mechanical work.
2. Something regarded as necessary to the carrying out of one's occupation or profession.



Tools are also sometimes called “technologies” and may include work practices such as chemical weed control versus hand weeding or using an impact wrench versus a manual socket ratchet.



We have tools because the human body has limitations. For instance, you can't sufficiently loosen or re-tighten the lug nuts on the wheels of your vehicle. You would need a lug wrench, impact wrench, or similar tool to accomplish the task. Think of the simplest tool, such as a hammer, and imagine living without one, especially if you were a farmer. (Show one or two different sizes of hammers.) Different bodies have different limitations. The largest person in the class is more likely to be able to lift a heavy object than the smallest person in the class. People with disabilities simply have different limitations than people without disabilities. Therefore their requirements to perform a task might be different from people without a disability.



Just like the smallest person in the class could easily use a hydraulic system to overcome their strength difference with the largest person in the class, so also can people with disabilities use tools to perform tasks done by those without disabilities. As noted earlier, each of us is "disabled" without access to tools. Think of the last time you were working in a field and needed a simple ½" wrench to make a repair, but didn't have one. What did you do...improvise or head back to the shop?

Objective 2

Identify the ways that tools, technologies, and innovative work practices can benefit farmers and ranchers with disabilities.

Recognizing the unique needs of farmers and ranchers with disabilities, efforts have been made to identify special tools, technologies, and innovative work practices that could be used to enable these individuals to perform desired tasks.



"The Toolbox CD" (hold up the case) is a resource with more than 750 ideas or tools to assist farmers and ranchers in getting farm and ranch related jobs done. The tools shown in it can help farmers with disabilities as well as those without. Here are the different categories of products in The Toolbox.



- Toolbox product categories 1-5



- Toolbox product categories 6-10



Now we're going to test your knowledge – and your imagination – about some products from The Toolbox.

- The following slides will show a Toolbox product with its name. Ask the students first to brainstorm about the general purpose of the device, and then click the mouse again to reveal the purpose. Next, ask the students to identify the specific benefit of the product to people with disabilities (PWD), and then click the mouse again to reveal the special benefit for PWD.



- ❖ *Product:* Nail Starter Hammer
- ❖ *Purpose:* Starts nails with only one hand
- ❖ *Special Benefit for PWD:* Allows a person with only one hand to start nails easily



- ❖ *Product:* DR Powerwagon
- ❖ *Purpose:* Heavy-duty power wheelbarrow
- ❖ *Special Benefit for PWD:* Allows those with limited strength or arthritis to transport heavy materials



- ❖ *Product:* Attachmatic Hitch
- ❖ *Purpose:* Automatically hitches a wagon tongue to the tractor drawbar
- ❖ *Special Benefit for PWD:* Allows people with mobility impairments to hitch/unhitch without leaving tractor



- ❖ *Product:* Tractor Hand Control
- ❖ *Purpose:* Engages brake by hand instead of foot
- ❖ *Special Benefit for PWD:* Allows people who can't use their legs to engage brake or clutch



- ❖ *Product:* Air Stream Helmet
- ❖ *Purpose:* Provides filtered air to wearer
- ❖ *Special Benefit for PWD:* Allows people with respiratory impairments to work in dusty environments



- ❖ *Product:* Yak Trax
- ❖ *Purpose:* Increases foot stability on slick surfaces
- ❖ *Special Benefit for PWD:* Allows people with mobility impairments and arthritis to walk more safely on slick surfaces



- ❖ *Product:* Hydroponic Towers
- ❖ *Purpose:* Allows for growing gardens on vertical surfaces
- ❖ *Special Benefit for PWD:* Enables wheelchair users to reach garden plants easily



- ❖ *Product:* MobilVision Video Camera
- ❖ *Purpose:* Provides remote views around the tractor
- ❖ *Special Benefit for PWD:* Allows people with impairments to see views that normally require climbing or turning



- ❖ *Product:* Cushioned Parlor Mats
- ❖ *Purpose:* Provides softer surface for dairy farmers who must stand for long periods
- ❖ *Special Benefit for PWD:* Reduces stress and pain for farmers with arthritis and other impairments



- ❖ *Product:* Deck Chair
- ❖ *Purpose:* Restrains sheep and goats
- ❖ *Special Benefit for PWD:* Allows people with strength or mobility impairments to administer health care to animals



- ❖ *Product:* LevAlert
- ❖ *Purpose:* When installed on side of a grain bin at different heights, shows level of grain within the bin
- ❖ *Special Benefit for PWD:* Allows people with disabilities to check grain level without climbing



- ❖ *Product:* Click Rule
- ❖ *Purpose:* This ruler has raised markings and clicks every 1/16th inches when expanded
- ❖ *Special Benefit for PWD:* Allows users with visual impairments to measure accurately



- ❖ *Product:* Kawasaki Mule
- ❖ *Purpose:* All-purpose Utility Vehicle
- ❖ *Special Benefit for PWD:* Allows farmers and ranchers with mobility impairments to travel distances and over rough ground easily



Next we're going to watch two video clips of farmers who have experienced a disability but have decided to continue farming. On a piece of paper, identify as many tools as you can that each farmer is using to accommodate his disability. Try to categorize the devices as either specialized tools used only for people with disabilities or those used by any farmer. We will discuss your lists following the video.



- Show the video clips:
 - Arlan Bookwalter



- Dale Baerg

- When finished, write answers to student responses on board.



What sort of tools did you notice Arlan Bookwalter using?

- | | |
|--------------------------------------|--|
| - Motorized wheelchair (specialized) | - Tractor seat lift (specialized) |
| - Combination wrench (common) | - Harness around legs (specialized) |
| - Soil penetrometer (common) | - Welder (common) |
| - Low welding table (specialized) | - Low pegboard for tools (specialized) |
| - Concrete floor (common) | |

What tools did you notice Dale Baerg using?

- | | |
|---|---|
| - Motorized wheelchair (specialized) | - Vehicle wheelchair lift (specialized) |
| - Sprayer trailer (common) | - Tractor seat lift (specialized) |
| - Modified tractor controls (specialized) | - Tri-pin steering device (specialized) |
| - Two-way radio (common) but with modified control and mounting (specialized) | |

Objective 3

Explain why some assistive tools can present special hazards to farmers and ranchers with disabilities.



Farmers and ranchers are resourceful and innovative. It's sometimes said that there's nothing they can't fix with just some duck tape and baling wire.

Farmers with disabilities have also come up with ingenious solutions to overcome their barriers to farming. Let's look at some examples.

Here are a couple of tools that farmers have come up with to help them overcome a disability. Can you identify any potential hazards that could cause injury to the farmer?



- Sling lift for tractor



- Truck ramp

- List hazards identified by students.



Every tool and type of technology, if it uses any form of energy (electricity, hydraulic, compressed air, etc.) has the potential of causing injury.

Just because a farmer has already experienced a disability does not mean that he or she is immune from additional injuries.

When using a tool, technology, or innovative work practice to accommodate for a disability, safety is an important consideration.

How could the hazards we have listed be corrected or minimized?

- Have students suggest ideas for eliminating or guarding the hazards identified.

Summary



Everyone needs tools to perform tasks that they can't do with just their bodies alone. People with disabilities face challenges in completing tasks often taken for granted by people without disabilities. These challenges are especially evident when people with disabilities are involved in

agriculture. However, just like everyone else, they want to continue in their life's work, and this sometimes requires specialized "tools of the trade." These tools may be designed specifically for a person with a disability to perform a task, they may be technologies that are designed for the general public but have special value to people with disabilities, or they may be innovative work practices that change the way a task is performed. In many cases farmers and ranchers have used their ingenuity to make their own assistive technologies, and in those cases, it is essential to ensure that they are safe.

Ideas for Additional Activities

- Using *The Toolbox CD*, ask your students to find products that would help the following farmers with disabilities:
 - ❖ A cattle rancher who lost his right arm below the elbow
 - ❖ A farmer with paraplegia (paralyzed from the waist down) who has a custom hay operation
 - ❖ A hog farmer with severe arthritis in her knees and hips
 - ❖ A poultry farmer with severe visual impairments