



STAGE 4

FOOD SYSTEMS AND FARMING

Students will explore where food comes from and factors that influence ingredient choice. They will also learn how farmers use technology that can impact the ways we can grow food efficiently and sustainably.

Lesson 3 · Farm Technology

Overview

In this lesson, students will discover how technology is changing agriculture. They will explore how farmers use drones, sensors, robotics, GPS, and other innovations to grow food efficiently, solve problems, and support environmental sustainability.

Learning Goals Needed

Students will learn that:

- Agriculture has changed from manual labour-intensive to highly technical and more precise way of growing food.
- Modern farms use STEM skills such as GPS mapping, operating equipment like drones and autonomous vehicles, and monitoring fields with remote sensing.
- Farmers and others in agriculture are evolving and developing practices and equipment that protect the environment.

Materials Needed

- [Stage 4 Lesson 3 Teaching Slides](#)
 - [Student Resource Packet](#) (all lessons, printable)
 - [STEMterprise Deliverables Tracker](#)
 - Videos:
 - [Drones in Agriculture: Weed Detection \(1:00\)](#)
 - [What is Precision Agriculture \(4:28\)](#)
 - [Dino: Autonomous Mechanical Weeding Robot \(1:43\)](#)
 - [What is Agriculture Technology? \(9:00\)](#)
 - [Renewable Energy on a Grain Farm \(6:08\)](#)
 - [Active Viewing Questions](#)
 - [Researching Technology Questions](#)
 - [Reporting on Technology Sample Questions](#)
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Teachers' Notes

While advanced technology might surprise students, today's farmers use it to work smarter and implement sustainable practices.

This lesson uses videos to showcase real-life farm technology. Teachers may prefer to show the videos over a period of time, such as snack time over a week (a “chew and do” model), then engage in one of the tasks.

An [Active Viewing Questions](#) document is provided to boost engagement and facilitate thinking. After learning from the videos, select one of these three follow-up tasks based on your goals.

- [Researching Technology Questions](#) (Slide 13)
- [Reporting Technology Sample Questions](#)-Broadcasting/Podcasting (Slide 14)
- [Renewable Energy Lesson Plan and STEM Challenge](#) (Slide 15)

Optional Career and Coding Connections: a [Drone Operator](#) is the featured career and [Micro:Bit advanced Auto Farming](#) lesson relating to [UN SDG 15-Life on Land](#) is included. Teachers should review the required resources for the coding activity.



Field Trip! Consider asking a local farm equipment dealer for a tour! The sheer size and complexity of farm equipment is astounding.

Background:

Teachers! You may be learning about tech on farms for the first time. Here are some resources that will give you a head start.

- [Tech toolbox for sustainable farming - Good in Every Grain](#)
 - Ideas for introducing students to tech in agriculture
 - How farmers use technology for sustainable farming
 - STEM challenge, vocab, videos and more!
- [Coding in Agriculture - Good in Every Grain](#)
- [Using Drones & AI on Farms](#) - Video from Australia
- [What is SMART Farming?](#) - by IBM

Vocabulary

- **Autonomous:** able to do things on one's own; in machines, it means following coded instructions without a person operating the machine. Think: a robot that moves by itself.
 - **Debugging:** fixing errors. It means going back through your work to make sure everything is correct.
 - **Drone:** also known as an unmanned aerial vehicle; it is an aircraft without a human pilot or passengers. Drones can be very small or big.
 - **Precision Agriculture:** a way to farm that involves collecting, analyzing, and taking actions based on data. It helps grain farmers grow more while saving resources and time.
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Time Frame: Approximately **60** minutes, *not including* time for the research, reporting, or STEM Challenge tasks

Career Connection

There is an optional Career Connection at the end of this and all lesson slides and the [Career Connections Slides](#) can be found at this link. Career: Drone Operator

Curriculum Expectations

STEM Skills and Connections

- A2 identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades.
- A3.1 describe practical applications of science and technology

Earth and Space Systems

- E1.1 analyse long-term impacts of human uses of energy, natural resources

Language - Foundations

- B1, B2, B3: listening, applying oral communication skills, writing, punctuation, presenting

Transferable Skills:

- Critical thinking & problem solving; innovation; creativity

Agriculture/Agri-Food:

- Understand how agriculture has changed and how farmers apply technology to farm more efficiently and protect the environment
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STEMterprise References for Educators

STEMterprise Webpage: <https://goodineverygrain.ca/ontario-farming-stemterprise/>

Video Links

- [Ontario Farming STEMterprise: Grade 5 Pizza Shop Business](#)
- [Students: Are you ready for your own pizza business?](#)

STEMterprise Teacher Support Resources

- [Ontario Farming Grade 5 Educator Information Packet](#)
- [STEMterprise Grade 5 Assessment Planning](#)
- [Project Overview](#)
- [Combined Grade Activities](#)
- [Career Connections Slides](#)
- [Coding Connections Slides](#)
- [Good in Every Classroom Education Blog](#)
- [Good in Every Classroom Newsletter Sign-Up](#)

Stage 4 | Lesson 3: Farm Technology

Slide 5: Business Connection	This Business Connection slide is intended to get kids thinking about the learning ahead as it specifically relates to their pizza business. Encourage the students to make early connections about the learning goals and the connection to their business. These simple signposts give students a sense of where they are on their learning journey. You can note the number of stages and which lesson you're on in that particular stage.
Slide 8: Minds On!	Tell students - You have already learned about things that happen on a grain farm, such as what plants need to grow; what is in soil and the need to keep it healthy; and things that affect plant growth, such as too little or too much rain, bad weather, pests, and weeds (grade 3). Using that knowledge, let's make a list of problems farmers face and how technology or innovation could solve them. You might have students write them on anchor paper or sticky notes. Tip! Suggestions for prompts if students need them: seeing a field without driving on it to protect the soil; using something to measure moisture; some kind of machine that can work without an operator to give a farmer more time to do other jobs around the farm Alternate video suggestion: https://www.youtube.com/watch?v=I0ulkvx3Q2E
Slide 9: Innovative Technology	Ask Students - Did you know farmers today need to be scientists? Are you surprised to learn they must be good at computer technology? Modern farming uses lots of technology, such as drones, GPS mapping, digital sensors, and even robots! Tablets and smartphones are important farm tools. These videos show tech at work. Drones in Agriculture: Weed Detection (1:00). <i>*Teacher note: You may notice that this video shows a farmer hand-spraying weeds. This representation does not show the safety protocols farmers practise, such as wearing personal protective equipment, or using precise technology-assisted spraying methods. Technology supports agriculture to be more efficient and even safer, such as removing the need for farmers to be on the ground to attend to plants.</i> What is Precision Agriculture (4:28)

	Alternate video to demonstrate drone usage. It's 10min long and filmed in Australia, so you will want to show only a clip of this to your students. It's a great visual to demonstrate tech on farms: Using Drones & AI on farms
Slide 10: Robotic Weeding Machine	The Dino Robot is a weeding machine that is being tested in Canada Dino: Autonomous Mechanical Weeding Robot (1:43) Learn more at https://www.naio-technologies.com/en/news/large-scale-vegetable-weeding-in-canada-with-dino
Slide 11: What is Agriculture Technology?	Agricultural technology supports modern farmers by improving ag methods to help farmers grow more with less manual labour and fewer resources. The video covers every aspect of tech in farming today, including animal husbandry, as well as environmental protection and non-traditional farming methods such as hydroponics, AI. What is Agriculture Technology? (9:00). Note: This video provides context for the development and use of agricultural technology. Educators may choose to show only a selected portion of the video that best supports the lesson, rather than viewing it in its entirety.
Slide 12: What are other options?	Renewable energy used on farms can come from several technologies like solar, wind, geothermal, and hydropower. Renewable Energy on a Grain Farm (6:08)
Slide 13: Did you know?	Teachers should co-create criteria with their class for this task and provide students with the Research Technology Questions document. Sample Research Questions: Use books, videos, interviews, or reliable websites (like GoodinEveryGrain.ca) to help you answer these questions. A. Understanding the Big Idea • What kinds of grains do Ontario farmers grow? • What do we mean by <i>technology in farming</i>? • How has technology changed farming over time?

	B. Technology on the Farm • How do tractors, combines, or planters use computers or GPS? • What is a <i>robotic</i> or <i>self-driving</i> tractor? • How are <i>drones</i> used on grain farms? • How do <i>satellites</i> or <i>soil sensors</i> help farmers make decisions? • What are some <i>apps</i> or <i>programs</i> that farmers use? C. Farming and Sustainability • How does technology help farmers use less water, fuel, or fertilizer? • How does technology help protect the environment? • How can technology help farmers take care of their soil for the future? D. The Human Side of Farming • How does technology make farmers' work safer or easier? • Do all farmers use the same tools? Why or why not? • How do farmers learn to use new technology? • What might make it hard for a farmer to use new tech?
Slide 14: Technology in Grain Farming	Educator suggestion: have groups present on a different area of technology, possibly with presentations one/day for a week. Or have students put the reports on a poster and display them in or near the classroom. Provide students with a specific journalistic question - this could come out of their minds-on thinking. For example, how are farmers using technology to help avoid compacting soil on their farms? How are farmers using technology to grow healthy plants? Or, how are farmers using robots to solve problems on farms? See Reporting on Technology Sample Questions for examples. Remind them to use the 5 Ws + How. Students should prepare their report in business groups, or as you assign it. Students can present your report to the class or other business groups. Extension: Depending on time available, students could be assigned to work in teams to produce an actual broadcast using their phones or whatever devices are available. They could assign roles (editor to pull info from their reports, reporter, camera operator, interviewee) and dramatize an interview with a farmer(s). Show their reports to

	the class or have a special viewing for a select audience.
Slide 15: Renewable Energy	Check out the Renewable Energy STEM Challenge web link that includes additional resources for Grades 5–6. • Renewable Energy on a Grain Farm (6:08) • STEM Challenge • Engineering Design Process poster • Vocabulary/Word Wall • Assessment/Quiz Link to detailed lesson plan
Slide 16: Wrap Up	Reflection Consolidation. Alternate questions might include: Option 1 – From Field to Pizza <i>How could grain farm technology affect your pizza business's key ingredients, like flour for dough or the feed needed for dairy cows to produce cheese?</i> Option 2 – Sustainability & Responsibility <i>If your pizza business wants to be environmentally friendly, what can you learn from how farmers use technology to reduce waste and protect the soil?</i> Option 3 – Innovation & Business Thinking <i>Farmers use drones, sensors, and data to make smart decisions. How could your pizza business use technology in a similar way to improve your product or business operations?</i> Option 4 – Local Connections <i>Why might it be important for your pizza business to share with customers that its ingredients come from local grain farms using modern technology?</i> Option 5 – Critical Thinking Extension <i>What new ideas do you have for connecting your pizza business to local farming or sustainability after learning about technology on farms?</i> Ponderings.... • Higher yields can reduce the cost of ingredients; this can lead to more profit or lower product cost • Healthier soil can result in healthy plants which can make more

	nutritious pizza ingredients • Better control of growing conditions (fields, greenhouses, barns etc.) can result in a consistent and reliable high quality product • Automation can decrease the need for manual labour
Slide 17: What's Next?	The “What’s Next?” slide is intended to be flexible and may be customized or filled in by teachers based on their classroom needs, pacing, and next steps.
Slide 19: Career Connection	See AgScape link for career profile to learn more about Drone Operators Bill Gates quote image: Google Gemini Alternate Career Connection from LTS - (on right of slide) - Digital Farming Business Development
Slide 20: Coding Connection - Autofarmer	Review the coding lesson at this link before beginning. Since this is a more advanced coding activity, students will need experience using micro:bits and you will need access to relays and the necessary peripherals.