13

Digital Learning

TERMS

accessibility
app
asynchronous learning
blended learning
cloud
digital citizenship
digital learning
digital native
distance learning
e-learning
flipped classroom
game-based learning
gamification
global competence
hardware
Internet of Things (IoT)
learning management system (LMS)
mobile application
one-to-one device
online learning
podcasts
project-based learning
SAMR model of technology integration
scenario
serious games
software
synchronous learning
virtual learning
virtual reality

OBJECTIVES

This chapter addresses elements of four of the National Quality Program Standards for Agriculture, Food, and Natural Resources Education (National Council for Agricultural Education, 2016): Standard 1A: Program Design
and Instruction — Curriculum
and Program Design
Standard 1B: Program Design
and Instruction — Instruction
Standard 1C: Program Design
and Instruction — Facilities
and Equipment
Standard 1D: Program Design
and Instruction—Assessment
It has the following objectives:

1. Describe the role of technology in instruction.
2. Consider the relationship between technology and accessibility.
3. Identify examples of instructional technology that can be used in agricultural education.
4. Discuss how students can develop digital citizenship and global competency through agricultural education.
5. Differentiate between synchronous and asynchronous instruction.
6. Discuss ways educators can foster an engaging virtual learning environment.
7. Develop a classroom management plan that accounts for the responsible use of technology.
8. Discuss the use of a learning management system in planning, instruction, assessment, and management of learning.
9. List examples of how an agriculture teacher might leverage digital technologies to assess student learning.

Aja Burgess is an agriculture teacher at Sonoma High School. This year her school has introduced the use of one-to-one devices so students can have personalized access to digital tools and internet-based resources. Prior to this year, Ms. Burgess had primarily used paper-based resources, and she brought students to the computer lab in the library when needing to complete proficiency award applications or conducting research for a class project. In addition to the introduction of one-to-one devices, the school is also now using a learning management system (LMS) where teachers can post class assignments and resources, and students can submit their work. Although Ms. Burgess has been using an online gradebook for some time, she is rather unfamiliar with where to begin with her LMS and use of one-to-one devices.

Ayanna Ruth is an agriculture teacher at Santa Monica High School, where her students have been using one-to-one devices for several years. Her school administration requires all teachers to develop e-learning day lessons in advance of the school year so students can continue to engage in learning

experiences from a distance while teachers are participating in professional development days. Ms. Ruth is very familiar with integrating the use of one-to-one devices in her teaching, and her students have come to expect using them most days.

Ayanna and Aja are good friends from their days in college together. Feeling overwhelmed as to where to start, Aja calls her friend Ayanna to seek her advice on where to begin. Where would you start to learn more about utilizing technology to accomplish instruction using digital learning tools?

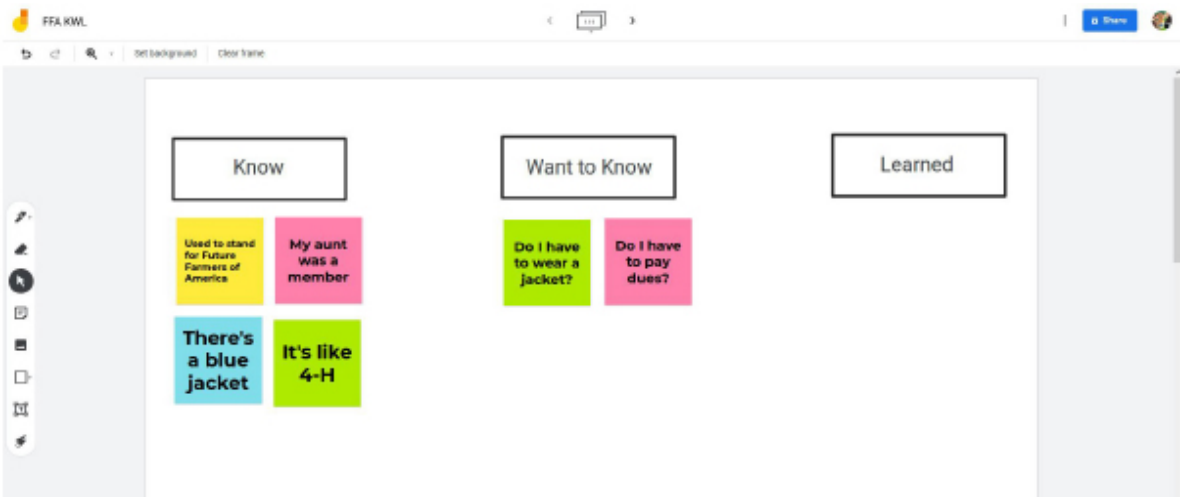

FIGURE 13.1 Google Jamboard is a free online tool that can be used in a variety of ways for a blended or virtual classroom. Here, students create digital sticky notes to capture their thoughts related to what they think they know and want to know about FFA.

THE 21ST-CENTURY CLASSROOM

Learning in the 21st century has drastically changed the way learners access and interact with information. Prior to the age of the internet, information was housed in libraries, encyclopedias, textbooks, and in the minds of educators. Now, knowledge and skills can be accessed through a quick internet search. Movies and music can be accessed through instant downloads instead of needing to make a trip to the store. As technology has increased our access to information, the role of a teacher has increasingly transitioned into one of a facilitator of learning, rather than a purveyor of knowledge.

Since technology is constantly evolving, it is likely certain technologies may become outdated very quickly. Consequently, this chapter will focus primarily on the guiding principles of teaching with digital technology instead of detailing how to use common educational software or tools. Examples of current technology will be provided, but readers should be cautioned to research the most up-to-date version of the technology to ensure they plan to use it appropriately. Technology access largely depends on the infrastructure to support digital and online technologies in local school districts and communities. Reliable high-speed internet access continues to be a challenge for many communities across the United States, limiting the full potential of many educational technologies.

Today's students are considered ***digital natives;*** they have always known a world where internet access is omnipresent, social media plays a key role in how they experience the world, and technology is a necessary component of functioning in a global society. Many industries, including agriculture, are researching the development of the Internet of Things, or IoT. The ***Internet of Things*** describes a network of items that have digital sensors embedded within them to collect data that can be shared with other devices on a network to improve performance and efficiency. Today, many people wear digital watches that in addition to telling time, also track heart rate, breathing rate, sleep quality, and activity levels. These "smart" watches are an example of an IoT sensor. In agriculture, the IoT is particularly of interest in crop production to develop sensors and drones that can collect precise data to inform agronomic decisions.

While students may have grown up surrounded by connective technology, they may not know how to use it safely or ethically. It is essential educators integrate opportunities for students to learn how to appropriately use technology within a practical application context.

Digital Citizenship

To prepare students for today's digitally connected society and workforce, it is necessary to help them develop skills to navigate technology. ***Digital citizenship*** is a concept that describes the traits of an appropriate, responsible, and empowered user and consumer of technology. The International Society for Technology in Education (ISTE) developed educational standards that outline competencies necessary to learn, teach,

and lead in the digital age, mapping out research-based standards for students, teachers, and educational leaders that define success in using technology in these spaces.

The ISTE standards for students (2016) outlined seven key competencies of successful learners in a digital world. Students should become empowered learners, digital citizens, knowledge constructors, innovative designers, computational thinkers, creative communicators, and global collaborators. Within each of these seven core competencies are specific standards that lead to overall competency. Students who demonstrate competency in digital citizenship "recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical" (ISTE, 2016). Following are the four standards associated with developing this competency:

1. Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
2. Students engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.
3. Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
4. Students manage their personal data to maintain digital privacy and security and are aware of data collection technology used to track their navigation online.

It is important that as agriculture teachers are planning instruction they consider how students will be using technology and plan to help students develop these competencies. ISTE offers several professional development opportunities and resources for educators to assist them in cultivating digital citizenship in their students. To learn more visit https://digcitcommit.org/.

Global Competency

Technology has allowed our world to become increasingly connected. Video chat platforms can connect students to industry professionals and classrooms across the country and around the world. While agricultural education programs do serve the needs of the local community, it is also necessary to

prepare students to engage in a global society. Increasingly, employers want to hire workers who are globally competent. A person who demonstrates ***global competence*** has the disposition and knowledge to understand and act on issues of global significance. Educators are tasked with helping students develop their ability to compete, connect, and cooperate on a global scale to ensure they are prepared to meet the demands of our increasingly global world.

To help CTE teachers cultivate global competency in their students, the Association for Career and Technical Education (ACTE) collaborated with the Asia Society Center for Global Education to develop the Global CTE Toolkit (https://asiasociety.org/education/global-cte-toolkit). Extensive resources are available to help teachers develop lessons that not only address global competence, but also cultivate students' ability to compete, connect, and cooperate through the appropriate use of technology.

Before considering how you might help your students develop their global competence, it is also important to understand your own global competence. The Globally Competent Learning Continuum (Tichnor-Wagner et al., 2019) was developed to help educators reflect on their own level of development of dispositions, knowledge, and skills necessary to teach diverse learners to be prepared to engage in a global society. This self-reflection tool can be a great place for educators to begin their journey of integrating global competence and responsible technology use into their instruction. The Globally Competent Learning Continuum and other educator resources is available at http://globallearning.ascd.org/lp/editions/global-continuum/home.html.

Specific resources in agricultural education to help students and educators develop their global competency within the context of agriculture, food, and natural resources are available through the Global Teach Ag Network. Each year a Global Learning in Agriculture (GLAG) conference is hosted online to connect with educators and students around the globe. For more information on the Global Teach Ag Network and the annual GLAG conference, visit https://sites.psu.edu/glag.

Ensuring Equity

When making any educational decisions it is essential to consider the needs of your students. Introducing the use of technology can definitely enhance your lessons, but may also have unintended inequitable consequences. In

schools where students have been provided individual devices, it may be tempting for teachers to regularly assign homework that requires students to use their device to research issues using the internet. For students from low-income families or those who live in areas that do not have broadband internet access, completing these types of assignments would prove challenging, if not downright impossible. Additionally, technology should be accessible for students of all abilities. Students who are diagnosed with a learning disability may use assistive technology to help them interact with instructional materials. For example, a student who is diagnosed as having a visual impairment or blindness might use a screen reader that reads electronic documents aloud. To ensure educational equity in this space, it is essential the instructor develop educational materials that can be read aloud by such assistive technology.

If a school holds e-learning days or is conducting instruction in an online virtual setting, considering how you will work to ensure equity is paramount. Students completing work from their home environment may not always have access to a safe, comfortable, and ideal environment in which to focus on learning. Planning for ways to adjust instruction or assessment for students to allow for maximum student success is important. Be sure to check with your school's administration to determine how you can navigate issues of equity specific to your students and surrounding community.

SAMR MODEL OF TECHNOLOGY INTEGRATION

Technology should not be used for the sake of technology. It should be used to advance student learning and skill development. A useful framework for integrating technology into your instruction is called the SAMR model.

As technology has improved and changed over time, so have the types of technology utilized in education. The vast variety and options available in educational technology can feel overwhelming at times when trying to decide how to best use technology in your instruction. When planning instruction, it is essential teachers continuously reflect upon how they can do a better job helping their students engage with the lesson content, which may mean deciding to use technology. To help teachers navigate making instructional decisions about integration of technology into their teaching,

Dr. Ruben R. Puentedura (2006) developed the ***SAMR model of technology integration***.

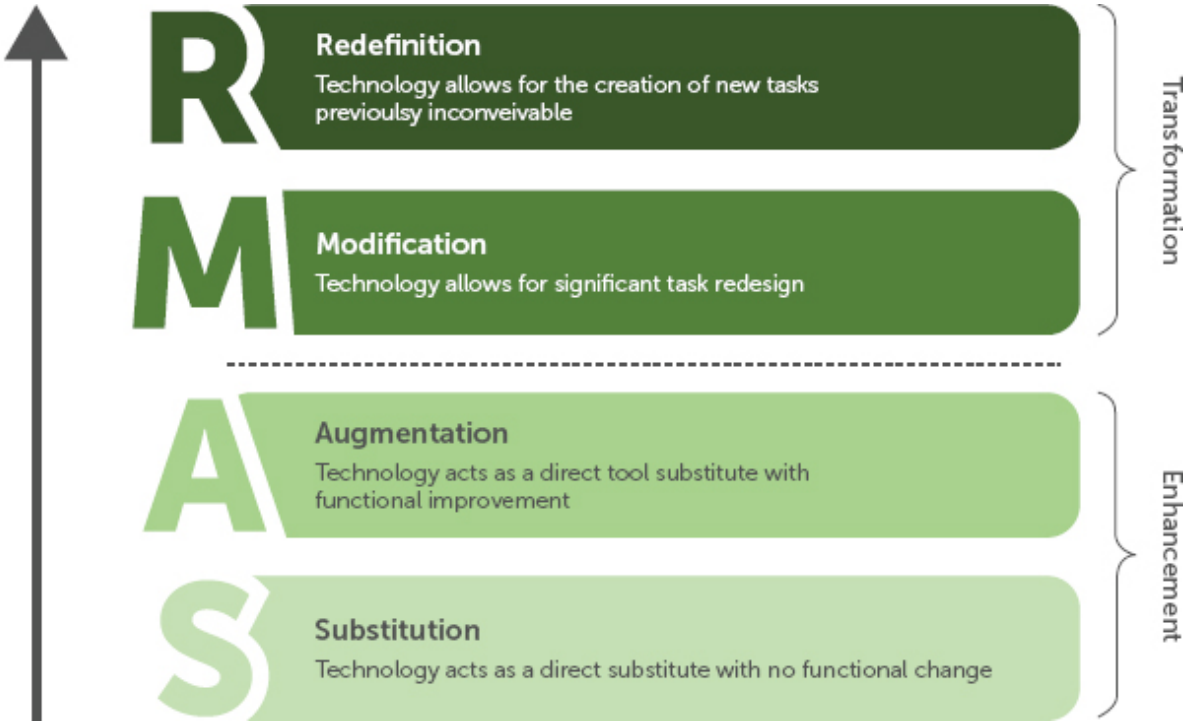

FIGURE 13.2 The SAMR model. (ADAPTED FROM PUENTEDURA'S [2006] SUBSTITUTION, AUGMENTATION, MODIFICATION, AND REDEFINITION [SAMR] MODEL.)

The SAMR model (Figure 13.2) illustrates how teachers can enhance existing instructional activities or even transform them into new learning experiences with the introduction of technology. Puentedura described many teachers as likely enhancing their lessons through substituting technology for previously existing approaches. For example, an agriculture teacher might decide to have their students research diseases affecting dairy cattle and assign students to create a poster presentation about the disease. Instead of having students create a physical poster with poster board, markers, and glue, they might have students create a digital poster using PowerPoint, Google Slides, or Canva. The assignment is still essentially the same, but substituting the type of technology used introduces an opportunity for students to practice digital citizenship skills.

Using the same assignment as an example, a teacher could choose to have students create infographics about dairy cattle diseases and then create a post about the diseases to share on the FFA chapter's social media accounts with

the infographic. Students still create content about dairy cattle diseases, but the mode in which they are expressing their learning is different.

To transform a lesson using technology, a teacher would need to consider how they may redesign learning outcomes to better leverage student understanding of the content in tandem with the technology. Learning about dairy cattle diseases can occur in a variety of ways.

TABLE 13.1
Examples of How Technology Can Be Integrated Into Existing Instructional Activities Following the SAMR Model

	Substitution	Augmentation	Modification	Redefinition
Content	Unchanged	Unchanged	Unchanged	May be modified
Learning Tasks	Convert from hard copies to digital	Incorporate interactive digital features to enhance lesson content	Learning tasks completely redesigned to allow for a richer array of learning through digital tasks	Learning tasks fundamentally transformed to allow activities previously impossible in traditional brick and mortar classroom
Examples of Changes	Scan worksheets/ convert to PDFs Provide synchronous and asynchronous versions of lectures	Digital portfolios of learning Gamify quizzes with Kahoot, Quizizz, and GimKit Virtual bulletin boards like Padlet HyperDocs lessons	Use an LMS like Google Classroom, Moodle, Schoology, or Canvas Backchannel communication to engage quiet learners Asynchronous discussion threads	Virtual pen pals, field trips, panel speakers Students write their own wikis or blogs for public consumption and feedback

Integration of technology can lead to more empowered students and is a natural fit for conducting student-centered instruction. To hear more from Dr. Puentedura about the SAMR model, go to https://youtu.be/ZQTx2UQQvbU.

DIGITAL LEARNING

Everyday life increasingly relies upon digital technology from the computer chips that regulate fuel consumption in the vehicles we drive to thermostats in our homes and robotic vacuums. Often without thinking about it, we put on smart watches, put smart phones in our pockets, and get into keyless entry cars. Digital technology is all around us! Education has begun to integrate

digital technology into instructional activities, but digital learning is a concept that is difficult to define. Digital literally refers to technology that is coded using a series of ones and zeros, but it is often associated with technology that allows for connectivity to the internet. While digital learning does utilize educational technology, it is not the same thing. ***Digital learning*** leverages the connectivity of the internet along with educational technologies, allowing for the development of a wide range of approaches to learning to create individualized learning opportunities for students. There are several different approaches to digital learning that are discussed in the section that follows.

E-Learning

As technology and distance education have increasingly become a part of secondary and postsecondary education, the definition of e-learning has varied. Definitions have included a focus on technology, the delivery system in which knowledge is accessed, the communication technologies used, and on shifting the entire educational approach to teaching and learning. In this chapter we will focus on ***e-learning*** as a day of instruction that occurs either planned or unplanned, in which students learn from a distance. For example, students may have e-learning days when the school district has a planned teacher professional development in-service day, or they may have e-learning when a snowstorm unexpectedly cancels school. E-learning days may also be known as online learning days, cyber learning days, virtual days, or another similar term.

E-learning days typically count toward state-mandated attendance and instruction requirements, but the format of these days varies significantly from state to state and from district to district. Some schools may require teachers to develop e-learning plans at the beginning of the school year, much like emergency substitute teacher plans, while other districts allow teachers to develop e-learning plans as they go along, following the natural flow of instruction. Check with your school administration to identify the format and expectations of e-learning requirements in your community.

Virtual Learning

Learning that occurs from a distance through internet-based instruction is referred to as ***virtual learning*** or ***online learning***, or ***distance learning***.

During the COVID-19 pandemic, schools around the world shifted to an emergency remote teaching model of instruction, in which all instructional activities were immediately moved into a virtual or distance learning format. In many cases, teachers who had never taught in an online format were asked to develop content and teach from a distance. As of the time of this book's printing, some schools are still teaching in a virtual format.

Prior to the COVID-19 pandemic, some states developed completely online virtual schools in which students attended all of their classes in an online format. Most of these schools do not include agricultural education as an offering, but some states such as Indiana and Florida do have agricultural education included as a virtual option. In states such as South Dakota, some students have accessed agricultural education coursework through distance learning, in which an agriculture teacher at a school in another part of the state would instruct students through a live video feed. Distance learning conducted in this manner is sometimes the only way students who live in remote areas can access agricultural education.

Depending on the expectations of your district and the needs of your students, educators may design virtual instruction to occur in synchronous or asynchronous formats. These approaches are discussed in more detail in the next sections.

Synchronous Learning

Synchronous instruction is also known as "live" or "real-time" instruction. In a traditional face-to-face classroom, students attend class all together at the same time each day, in a synchronous fashion. When teaching online at a distance, synchronous instruction occurs when students log in at the same time as the teacher and the teacher facilitates learning activities during that time. ***Synchronous learning*** sessions might be recorded and shared for students to access at a later point, but students would likely not be able to participate in any of the planned learning activities that occurred during a synchronous session. Teachers should be cautious about the potential effect of holding only synchronous instructional opportunities for students who do not have regular access to high-speed internet, might have other responsibilities at home (such as caring for siblings), or may have to share their device or internet bandwidth with others.

BOX 13.1 ***Examples of Learning Activities Appropriate for Synchronous and Asynchronous Learning Formats***

Synchronous Learning Activities

Provide real-time feedback on work in progress
Provide personalized 1:1 coaching
Facilitate real-time conversations
Incorporate guided practice and application
Build community and relationships
Lead interactive modeling sessions
Foster collaboration among students
Differentiate instruction for small groups

Asynchronous Learning Activities

Listen to podcasts
Explore teacher-curated resources
Reflect and document learning
Watch video-based instruction
Read and take notes
Engage in online discussions
Practice and review
Research and explore

Adapted from Tucker (2020b).

Since real-time instruction may be available at a premium, instructors should consider what learning activities will be of the greatest value to students during these sessions. These sessions are ideal for providing feedback and building relationships with students in an online instructional environment. Conducting a lecture in which students do not get to interact with the teacher will likely not be as valuable as getting individualized attention from the instructor, or an opportunity to connect with peers in a collaborative environment. Box 13.1 provides examples of learning activities to use in a synchronous online learning environment.

Asynchronous Learning

Unlike synchronous learning, ***asynchronous learning*** activities occur on demand at any time that works best for the student's schedule. Much of online coursework designed for adult learners who attend college part time is

designed to be delivered in an asynchronous fashion. On-demand learning activities are available similarly to how movies are available to watch at any given time on a streaming platform like Netflix. Asynchronous activities have the benefit of being flexible and allowing students to work when they are most able to focus on or attend to their work. Conversely, students who may not be particularly motivated to engage in the learning, or who may have a difficult time managing their time independently may struggle to complete asynchronous learning activities. See Box 13.1 for examples of asynchronous learning activities.

Blended Learning

Blended learning, similar to many of the terms we have already discussed, is a broadly interpreted, difficult to define concept. ***Blended learning*** refers to a variety of modes of face-to-face instruction that integrate a component of online learning. Regardless of what type of approach is used, blended learning provides a large amount of flexibility for teachers and students. One particularly useful model for blended learning is the teacher-designed blend, a term coined by edtech expert Dr. Catlin Tucker. In the teacher-designed blend, the teacher is still the primary decision maker regarding curriculum content, organization, and edtech tools, and instruction still mainly occurs in face-to-face settings. This face-to-face instruction can be supplemented with online learning modules, and a learning management system is used to facilitate completion of assignments, share resources, and organize grades.

According to Tucker (2012), using a blended learning approach in the classroom should prioritize the teacher working directly with students to build positive relationships and promoting learning and discovery through an online network. Using a blended approach, teachers can leverage the power of technology not only to engage their students in learning in new ways, but also to save on preparation time, printing costs, and time spent grading.

At the heart of the success of the blended learning model is discussion. Without meaningful opportunities to discuss and connect new concepts, the various learning activities become rote tasks students complete in increasing isolation. Blended learning approaches allow for discussion to occur not just in a face-to-face, out-loud verbal conversation, but also to occur through online platforms, backchannel conversations, sticky notes, and in many more ways. Incorporating opportunities for students to practice discussing the

content not only helps them become more connected to the instructor and their peers as an educational community, but also helps them practice the appropriate skills of communication using various technologies.

Flipped Classroom

In *a **flipped classroom*** teaching model, the teacher creates various forms of content delivery such as a recorded lecture, or curated readings for students to review outside of class time. Instead of focusing on content delivery during class time, the teacher prioritizes application and extension activities for students to clarify and deepen their understanding of the content. The teacher is also available for assistance to work with small groups of students who may need more support, while other students might begin working on other meaningful active learning activities. In this manner, students complete lower order learning activities on their own and engage in richer higher order learning activities together in class. For more information on higher order and lower order cognition, see the section on Bloom's taxonomy in Chapter 12.

EDUCATIONAL TECHNOLOGY TOOLS

Technology is constantly being developed, updated, or becoming obsolete. Advancements once thought innovative and cutting-edge may no longer become useful as improvements lead to replacement within months or years of release. Consequently, this section will not attempt to describe specific educational technologies in detail, but instead will provide a broad overview of currently existing resources to support implementation of agricultural education in the 21st-century classroom.

Regardless of what tool is selected, it is imperative that educators consider the accessibility of the tool to their students. ***Accessibility*** ensures that educational materials and technologies allow people with disabilities to learn the same content and experience the same educational experiences and benefits as those without disabilities (CAST, n.d.). In addition to considering the needs of students who have disabilities, it is helpful to consider resources to which your students have access. For example, some of your students may have high-speed internet at home, while others do not. Considering

accessibility when planning your instruction is vital to ensuring that you are curating equitable learning experiences for all students.

Hardware

Physical equipment that allows users to interact with digital tools is referred to as ***hardware***. For example, the laptop and its components (such as the keyboard, memory chip, and motherboard) would be hardware. The internal processors that allow for computing speed and quality have become smaller and smaller in size as chip technology has improved. As a result, many devices including laptops, phones, screens, and printers have become smaller or sleeker in design.

One-to-One Devices

Issuing each student a personal device to use for educational work is becoming increasingly the norm at schools around the United States. Schools "check out" a device to each student much like issuing a textbook for the year. When each student has been issued technology to use in this manner, the school has a ***one-to-one device*** program. Learning activities in a blended learning environment are most efficient when each student has access to their own fully charged device that can access the internet.

Examples of popular devices used in these programs include the Google Chromebook, Apple iPad, netbooks, and laptops. With the use of such devices, teachers will need to consider how students will learn appropriate care and use of the technology in the agricultural education classroom and lab.

Digital Lab Equipment

A variety of equipment used in the agricultural education laboratory is becoming digital. Soil probes, microscope lenses, wildlife trail cameras, and many more types of equipment are now able to connect wirelessly to other devices or upload data and/or pictures to the internet.

A popular device widely used in various CASE curriculums is the LabQuest, manufactured by Vernier. This small computer can connect to a variety of probes including those that measure temperature, pH, turbidity, dissolved oxygen, and many more. This device does need to be regularly charged and checked for updates. The LabQuest can organize and visualize

data collected from these sensors and store the collected data on a cloud server. A ***cloud*** server is a server that is accessible via a network, typically the internet. Data stored on an internet-based cloud server can be accessed from any approved devices that have an internet connection. Agriculture teachers should be sure to check their lab equipment in advance of needing them for a lab to ensure all devices are charged and up-to-date, as sometimes these updates significantly change the way the device operates.

FIGURE 13.3 A variety of digital lab equipment exists including these tools used in a veterinary science class. From left to right: A digital stethoscope that can be connected to classroom speakers, a digital otoscope that connects to a laptop or computer to project a live video image to a screen, and a digital sphygmomanometer that can also connect to a laptop.

FIGURE 13.4 It is important to check that lab equipment is fully charged and has up-to-date software in advance of using it in the laboratory setting. Here, two agriculture teachers are ensuring that a Vernier LabQuest has up-to-date software.

Software

While hardware is the physical equipment, it is the ***software*** that controls the system. Some software needs to be downloaded onto a computer using a USB drive or CD, but increasingly software can be downloaded through a password-protected online portal. Agricultural education courses might use specific software to draft landscape designs or organize and track crop production records.

Learning Management System

A learning management system (LMS) is essential to digital learning. A ***learning management system*** is an online portal that serves as an access point for students and teachers to interact with class materials. Teachers can upload teaching materials for students to access, create spaces for students to submit work, post assessments, and facilitate discussion. Some learning management systems allow for integration with an online gradebook so students can see their grades in the same location as their classwork.

Popular learning management systems include Google Classroom, Canvas, Schoology, and Moodle. Each school district has their own designated LMS, so be sure to develop a thorough understanding of how to utilize the specific LMS at your school. If a school uses an LMS, it is likely

they expect all teachers to regularly update and maintain their LMS. Each LMS software company usually posts extensive resource videos and training materials on their websites to help teachers better utilize the features of the LMS.

Mobile Apps

As smartphones and tablets have become increasingly a part of our everyday life, their functionality has been continuously improved to assist the user. Given the smaller dimensions and portable nature of smartphones and tablets, the user interface of the devices is different from that of a desktop or laptop computer. Software designed to operate on a mobile device is referred to as a ***mobile application***, more commonly referred to as an ***app***. An app is downloaded from an online source such as the Apple App Store, or Google Play Store. Apps may be available for free download or through a download fee.

Apps can be used for a variety of purposes including gaming, productivity, lifestyle/entertainment, mobile commerce, and education. Teachers might use certain apps to increase or regulate their own time management, or could use these same apps to assist their students in developing self-regulation skills. Educational games such as Farmers 2050 are accessible via an app, as are other farming simulation games like The Herd. Such games can prove useful for an agriculture teacher looking to develop opportunities for their students to practice making agricultural production decisions in a controlled environment. The popular agricultural education online record book Agricultural Experience Tracker (AET) has an app version that allows students to easily enter their records and upload photos from their phones. The ease and proximity of access to the AET may help students complete requirements of their SAE and agricultural learning experiences more fully. Apps might also be utilized in laboratory instruction to identify plant and animal specimens, such as the iNaturalist app developed as a joint initiative of National Geographic and the California Academy of Sciences.

While apps have the benefit of being transportable, they do need to be compatible with your school's technology requirements and restrictions. To maintain maximum functionality, apps may need to be regularly updated, requiring a clear and strong internet connection. Some apps may require users to create a username and password, while others may ask for access to

personal information that may not be appropriate for the school setting. Be sure to appropriately screen use of apps before using them with your students and school equipment.

Learning Games

Capitalizing upon their ability to motivate learning, games can promote learning through apps, online environments, and downloadable software. Malone and Lepper (1987) identified four key characteristics of a learning game:

Challenge—The player/learner works to attain realistic and relevant goals through a variety of difficulty levels. Activities completed to attain the goals provide opportunities for learners to receive feedback and create feelings of competence.

Curiosity—Sensory and cognitive interest is promoted through the visual effects of the game as well as inherent challenges or problems that may surprise the learner.

Control—The learner has the ability to make choices throughout the game that reinforce their sense of control over their learning/play experience.

Fantasy—The learning game attends to both cognition and emotions of the learner in a way that is both appealing to the learner and directly related to the content to be learned.

Schaller (2005) suggested adding two more features of a learning game:

Iteration—The game provides repeated opportunities for the learner to experiment, hypothesize, and synthesize their learning.

Reflection—Opportunities for the learner to reflect upon their iterative learning experiences should be woven into the game.

Upon closer examination, one can see the elements of experiential learning (Kolb, 1984) present through these characteristics of a learning game. For more information about experiential learning, see Chapter 21.

Audiovisual Tools

Digital technology presents new opportunities for educators to incorporate immersive multimedia in the place of or extending real-life experiences. This section will describe how video, virtual reality, and podcasts can be utilized as audiovisual tools in agricultural education.

Video

Videos can be used for three primary purposes: delivering direct instruction, expanding upon concepts in a supplemental fashion, or assessing learning and skill development. Videos are a popular way to deliver instruction in a flipped classroom model and can be an efficient way to engage learners in an asynchronous learning environment. Videos can also be used to augment face-to-face direct instruction to illustrate a concept or skill that may not be possible to demonstrate with the available resources in the agriculture classroom or laboratory. Box 13.2 shows how videos can be used in a variety of ways in an agriculture classroom.

An agriculture teacher might choose to use preexisting videos or to create their own videos to accomplish a variety of purposes including demonstrating agricultural or computer-based skills, screen recording lecture notes, capturing skill development for instructional use in future classes, conducting a virtual field trip, interviewing potential guest speakers, or marketing their agriculture program for recruitment purposes. Keep in mind the agriculture teacher does not have to always bear sole responsibility for the creation of videos such as these; students might also create videos as part of an assignment or to assist in promoting the FFA chapter and agriculture program.

Selecting the right video for your students is an important decision. Previewing videos in their entirety prior to showing them to students is essential! Consider the following criteria when determining what video(s) to use during instruction:

- Does the video align with your educational standards and learning objectives?
- Is the vocabulary in the video appropriate and at an optimum comprehension level for your students?

BOX 13.2 *Examples of Video Use in an Agriculture Classroom*

Instructional

Can replace or serve as alternative to direct instruction
Useful in the flipped classroom model and asynchronous learning
May be created by the instructor or be previously existing from reputable source

Supplemental

Motivate student exploration and problem solving
Complement in-class work, piquing interest and driving inquiry
Expand on topics or offer an alternative explanation

Assessment

Students watch videos of themselves or others perform a skill and analyze for various items
Students create videos to demonstrate their learning and skill development
Students are assessed on their ability to evaluate specimens presented in video

Adapted from Tucker (2013).

- Will the video make sense in the context in which you plan to use it?
- Is the video up-to-date in language, production value, and examples?
- Does the video contain sensitive topics that may need parental or administrative approval prior to showing?
- Consider the video source, intended target audience, and potential bias of the video.
- Consider the length of the video; you may need to chunk the video into smaller segments.
- Is the resolution or pixilation appropriate for the size screen it will be viewed on?

Once you have settled upon the appropriate video for your instruction, consider how you will structure your students' viewing experience. Might it benefit students to pause the video at specific points to emphasize key concepts, check for understanding, or allow for discussion? Does the entire video need to be shown, or can you show excerpts? Should students view the video multiple times? The prior knowledge and learning experiences of your

students can help guide you in making decisions on how to best scaffold the video viewing experience, whether that be in a teacher-led face-to-face classroom or in a virtual setting.

A useful video viewing platform for showing videos online in an asynchronous format is Edpuzzle (see Figure 13.5). Using this online platform, teachers can use online videos or upload their own video, and then embed questions within the video for their students to answer. Students can then view the video in the manner the teacher determines will best scaffold their understanding of the concepts presented.

Videos are useful not only for demonstrating skills and delivering content, but also for spurring critical thought. In an agriculture classroom, students might view a commercial that presents a particular perspective, and then analyze the video for evidence of that perspective. To enhance student understanding, it is important to teach students how to watch a video with purpose. To help students critique videos, Palmer (2014) suggested showing a short video clip multiple times. During each successive screening, students should be prompted to focus on different elements of the video:

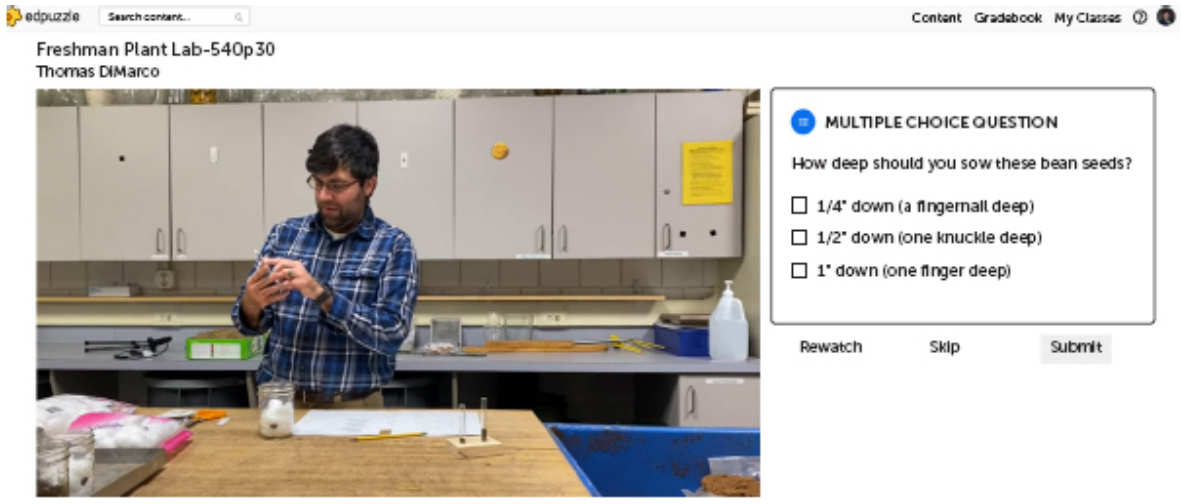

FIGURE 13.5 Edpuzzle (https://edpuzzle.com/) allows teachers to embed questions at key points within selected videos to check for student understanding. (COURTESY OF THOMAS DIMARCO.)

Screening 1—Look and listen for the main ideas. Write down the three that stood out to you the most.

Screening 2—Look for evidence of support for these main idea.

Screening 3—(mute the video) Pay special attention to the images and selected scenes. What do they convey? How do they contribute to

the main idea?

Screening 4—(unmute the video) Focus on the soundtrack. How does the music contribute to the message?

Screening5—Pay special attention to the delivery technique of the speaker (if there is one). How does their delivery engage the listener/viewer?

Using the above technique can be helpful, particularly when showing videos of a prepared speech, debate, commercial, or a series of videos featuring individuals with varying perspectives on a controversial issue.

Virtual Reality

Virtual reality technology (or VR) allows students to explore a computer-generated three-dimensional virtual environment using multiple senses in an immersive fashion. Virtual environments present the participant with realistic, life-sized surroundings that are interactive, allowing for a free-flowing, seemingly natural experience. This technology is increasingly popular in the video gaming industry, but it is also used in various industries to train new employees in psychomotor skill development, including medicine, aviation, and construction trades such as welding. Wells and Miller (2020a, 2020b) determined school-based agricultural education teachers in Iowa generally view VR technology favorably, particularly as it relates to psychomotor skill development, but also believe the technology to be too costly to implement in their classrooms and laboratories. Virtual reality technology has been used to train skilled welders, but needs additional research in school-based agricultural education to determine the practical implementation of these technologies.

Virtual reality can also be used for giving virtual tours of your program as a program recruitment strategy. Tools such as ThingLink have the potential to be used for immersive tours, instructional aids, and helping students practice for a competitive event.

Podcasts

Podcasts are digital audio files created to share information with others. The word itself is a mashup of the words “iPod” and “broadcast,” but podcasts are not limited to exclusively Apple devices. Podcasts are available to download from Apple iTunes, Google Play, Spotify, and many more online

locations, typically free of charge. They can be listened to on a mobile device or on a computer, allowing for flexibility and accessibility that is appealing to educators.

There are several benefits to using podcasts in the classroom: they are portable, relevant to current events, available in a variety of lengths, help support multilingual learning, and meet academic standards. In some cases, podcasts can serve as an alternative or supplement to reading printed text to support reading proficiency. Many podcasts include rich storytelling components, featuring a variety of guests or characters, sound effects, and music. Listening to stories helps support brain development and cultivates psychological safety. Much like a thought-provoking video, podcasts can be used to kick off the start of a unit, deepen exploration of a topic, or listen to the perspectives of others. They can be used as the main resource for a lesson, or as a supplemental learning activity to support student learning.

In addition to utilizing podcasts for student learning, there are a variety of different podcasts that are great resources for educators looking to hone their craft. Some examples of popular education podcasts include *Cult of Pedagogy, EdSurge*, and *The Hechinger Report*. Agricultural education–specific podcasts are also available, including *Owl Pellets: Tips for Ag Teachers* (2021) and NAAE's *Connect* (2021). *Owl Pellets* is a podcast that specifically explores practical tips for agriculture classrooms drawing from agricultural education research, while NAAE's *Connect* works to "educate listeners about NAAE resources, inform them of new and innovative practices, and connect current and future agricultural educators and supporters" (www.naae.org).

DIGITAL LEARNING ENGAGEMENT STRATEGIES

It is essential to design digital learning in a manner that builds on student motivation and interests, providing meaningful opportunities to interact with the material. Utilizing an active learning approach, educators can create meaningful opportunities for students to interact with the material and structure experiences they can reflect upon, which will drive future learning. Some of the major strategies utilized in digital learning are described below.

Game-Based Learning

Games can be used to educate and train students to develop skills and knowledge. While video games are quite popular among many students, video games tend to primarily focus on entertainment value, while game-based learning does not prioritize entertainment as a main focus. Instead, ***game-based learning*** uses games to educate.

There are two different categories of games leveraged in education: serious games and gamification. ***Gamification*** involves integrating elements of game play such as points, levels, and badges into learning activities, but in a manner that is not meant to entertain. ***Serious games*** provide non-entertainment-focused opportunities for students to wrestle with real-world problems and challenges, allowing for practice and training that is engaging.

Game-based learning can provide opportunities for students to directly participate in a role play or simulation experiences. These powerful learning experiences can lead to enhanced skill development, cultivation of critical thinking skills, problem-solving skills, information gathering, and team-building skills (Gros, 2007).

Project-Based Learning

As mentioned in Chapter 12, project-based learning can serve as a framework that guides units and courses. According to the Buck Institute for Education, ***project-based learning*** is a teaching method in which students tackle an "authentic, engaging, and complex question, problem, or challenge" (2021). This approach to teaching and learning can be useful in both face-to-face and online learning spaces. Entire courses can be structured around a particular challenge, with subsequent modules dedicated to elements of solving the messy problem. While some elements of project-based learning may require tactile manipulation of equipment or tools, some parts of the research and problem-solving process may be accomplished through independent or collaborative research in an online space. For more information on best practices in project-based learning, visit www.pblworks.org.

Scenario-Based Learning

A ***scenario*** is a type of story that focuses on a particular group of individuals and their goals within a described context. Scenarios can easily be integrated

into e-learning through a text format, or shared in a short video prompt. Scenarios are commonly used in agricultural education to describe real-world situations that students might find themselves in. According to Sorin et al. (2012), there are five major types of scenarios, as follows.

Skill-based Students would demonstrate skills they have already developed. For example, at the conclusion of an equine first aid unit, the agriculture teacher might draft scenarios that describe a scene in which the student would have to make decisions about the appropriate first aid measures to implement, such as bandaging the lower leg of a horse. Students would then actually demonstrate that skill.

Problem-based Students are presented a problem to drive integration of their theoretical knowledge and practical knowledge. Through their investigation of the problem, students practice making decisions. In an agricultural mechanics course, students might reason through a scenario that describes a situation in which a piece of equipment failed to perform. Students would need to draw upon their knowledge of the equipment's functions and their practical experiences working with similar equipment to troubleshoot the source of the problem and brainstorm possible solutions.

Issue-based Students take a stand on a particular issue. Considering the wide array of controversial issues related to agriculture, the possibilities are endless in drafting issue-based scenarios. Students might be prompted to form their own stance based on the described situation, or they may be assigned a perspective to illustrate. For example, when learning about animal rights versus animal welfare, students may be asked to take an initial stand on issues that emerge through a scenario describing the conditions of animal care. After exploring the differences and similarities between rights and welfare, students might revisit those same scenarios and take the stance of someone who advocates for one or the other perspectives.

Speculative Students make hypotheses or predictions about the outcome of a described situation, based on their current knowledge and context clues. These types of scenarios are helpful for kicking off a unit and uncovering prior knowledge and misconceptions. They can also be helpful when setting up an inquiry-based approach to learning. For example, scenes that illustrate

animal health might ask students to explore questions such as "What is wrong with this animal?" and "How do I know what is wrong with this animal?"

Gaming These scenarios use games as learning tools. Through the use of games such as Farmers 2050, students can explore different agricultural decisions and concepts by playing a game that simulates real-world settings.

CLASSROOM MANAGEMENT IN A DIGITAL ENVIRONMENT

Managing a classroom is comprised of all the things that a teacher does to organize students, space, time, and materials to maximize student learning (Wong & Wong, 2009). Teaching in a face-to-face setting with devices or teaching in an online setting might look a bit different from teaching face-to-face without any digital devices, but teachers can still be proactive in managing the learning environment to promote learning. In this section, we will discuss considerations for teaching in digital or blended spaces, but will not address discipline. Effective discipline usually begins at the school-wide level, with consistent expectations and consequences upheld across the whole school rather than reactive individual classroom-level discipline procedures. A word of caution: When teaching with individual devices, it is inadvisable to take away a device from a student as a consequence of inappropriate behavior; that should only be used as a last resort. Getting at the root of the behavior, but providing students with the tools to complete a learning task is important to help students become good digital citizens (Dowd & Green, 2016).

The following sections will outline building positive relationships with students, establishing expectations, considering organizational procedures, and managing the learning management system. More detailed information on classroom management in digital or virtual learning spaces can be found in the references list at the end of this chapter.

Building Positive Relationships

The foundation of any learning experience rests upon the relationship (sometimes referred to as rapport) between the student and the educator, and the students with each other. It is essential that teachers dedicate intentional

time to cultivating positive relationships with their students, regardless of the learning environment. Cornelius-White (2007, p. 113) identified five elements of teacher-student relationships that highlight a student-centered approach to teaching and relationship building:

1. The teacher is empathetic and understanding.
2. The teacher has unconditional positive regard for students.
3. The teacher is genuine and authentic.
4. The teacher cultivates student-led and -regulated activities; the teacher is nondirective.
5. The teacher prioritizes critical thinking as opposed to rote memorization.

When teachers and students have a strong, positive relationship, student mistakes are seen as learning opportunities rather than punitive, negative experiences. How teachers handle situations in which students stumble in their behavior or academic performance can strengthen or destroy a student's trust in the teacher. Clear communication between teachers and students enhances the development of positive, trusting relationships.

Building relationships with students can begin before they even step foot into your physical or virtual classroom. Sending home introductory letters/postcards/emails to share about yourself can be one way to make students feel more comfortable with you when they arrive in your class on the first day of school. You might also conduct student and family questionnaires to obtain baseline information about your students, their home life, what they value, and what motivates them. While a face-to-face setting allows plenty of informal opportunities for teachers to use humor, body language, and facial expressions to interact with students as they walk in the door, while they are working in groups, or see each other in the hallway, teachers need to be more intentional about how they build a relationship of trust and empathy in a virtual setting, particularly if it is in an asynchronous format.

Research indicates the more regular contact a teacher has with students, the more likely they will be successful in building positive relationships from a distance. In virtual settings, six key indicators contribute to building positive rapport at a distance (Murphy & Rodriguez-Manzanares, 2012):

1. The teacher makes an effort to recognize each individual student.
2. The teacher provides ongoing support and monitoring of learning through feedback and praise.
3. The teacher is available, accessible, and responsive within a timely manner.
4. The teacher and student are able to engage through other means beyond written text, such as phone calls, video chats, or audio recordings.
5. When the teacher does interact with students, the tone of the interaction is positive, respectful, friendly, and honest.
6. The teacher initiates conversations with students that are more social than academic, initiating small talk and demonstrating care and concern for their well-being as individuals beyond being a student in their class.

As you can see, many of these features of building rapport with students in online settings mirror what an agriculture teacher might do in an exclusively face-to-face setting. Should you find yourself needing to move from a face-to-face setting to an exclusively online setting, make sure to continue to cultivate positive relationships with your students in this new space.

Establishing Expectations

Many agriculture teachers use activities during the first week of school to get to know their students and to develop course expectations as a group together. Expectations are also important in a virtual or blended space. As with managing a face-to-face classroom, it is important to approach development of your expectations by evaluating your own beliefs about teaching and learning as outlined in your teaching philosophy statement. What type of learning environment do you hope to cultivate? What are your goals for your students upon completion of your course or graduation from the agriculture program? How do you believe the diversity of your students can be an essential component of cultivating classroom community? Your beliefs undergird all other decisions you make as an educator. Consider drafting a condensed version (one paragraph or so) of your teaching philosophy to share with students and their families at the beginning of the year.

Working together with your students, develop a list of norms or expectations of behavior and learning in your class. When students have the opportunity to contribute to the creation of these expectations, there is a greater likelihood of student buy-in and self-regulation in adherence to these community agreements. It is also beneficial to identify expectations for learning behaviors in the following settings: face-to-face with one-to-one or shared devices, asynchronous distance learning, and synchronous distance learning. Will students be expected to come to class with a fully charged device? How will you gain students' attention while they have their devices out? What is the appropriate time (if any) for food and drink to be present in the face-to-face classroom, especially when devices are being used? When is the appropriate time for students to be using their devices, and how will the teacher communicate this? How will earbuds/headphones be managed to ensure on-task behavior? Obviously, there are many more questions to be considered than these. How might you manage students, space, time, and materials in a blended or virtual setting?

Organizational Procedures

Keeping students organized and aware of the learning activities and upcoming assessments is important in any classroom. In a face-to-face setting, teachers often write these things on the whiteboard or chalkboard, but in a virtual or blended setting, they may post them digitally on a slide deck or learning management system home page. Posting weekly and daily schedules can be a helpful tool to communicate with students and their parents to ensure clarity and efficiency. Using online timers during synchronous online or face-to-face instruction can help keep both the teacher and the students on track to make maximum use of class time together.

In addition to organizing the structure of the class, it will be important for the agriculture teacher to consider how they will distribute assignments, collect student work, and any particular ways they want students to label their work upon submission. Will you have hard copies or digital copies of work for in-class assignments? What is considered "on time" in a virtual learning environment? Just as you may have organizational or clean-up procedures in your agriculture laboratories, you should consider how students should organize or clean up equipment used in a blended setting.

Communicating these procedures and having students practice them can ensure a smoothly run classroom, regardless of the learning environment.

Managing the Learning Management System

The layout and organization of your online presence can do much to support student learning and communicate the expectations of performance in your class to their families. Most learning management systems have customizable pages within the course shell. It is important to keep your classroom page up-to-date, organized, and uncluttered. Key questions to consider as you are organizing your classroom page include the following (Fisher et al., 2021):

- Where are the weekly/monthly schedules posted?
- Where are assignments and learning materials posted? Are they consistently available in the same space?
- How do students submit work?
- How do students find their graded work and read feedback?
- Is it apparent where students can contact the teacher for help with learning activities?
- How does the student get technical support?

To ensure maximum accessibility for all students, but especially those with disabilities, make sure to follow Web Content Accessibility Guidelines 2.0 (available at https://www.w3.org/TR/WCAG20/). This includes making sure websites are perceivable (color, background, text), operable (page can be navigated using a keyboard), understandable (text is readable and developmentally appropriate), and robust (the website is compatible with other assistive technologies). For more assistance with ensuring the accessibility of your online classroom portal, connect with your school district's IT staff.

ASSESSMENT OF LEARNING IN DIGITAL SETTINGS

As discussed in Chapters 19 and 21, assessment is an integral part of instruction. When planning instruction, the agriculture teacher should begin with identifying what they want students to know, do, and understand by the

end of an instructional unit, and then work backward from there, determining what assessments will provide the best evidence students have indeed met the identified target goals. These goals are informed by educational standards as well as the context of the local community and the students themselves. Teachers can use a variety of digital tools to enhance their ability to conduct formative and summative assessments of student learning. Each of these tools can be used in a variety of ways; a video recording tool such as FlipGrid could easily be used to assess prior knowledge, capture student learning during the learning activities, and be used to illustrate student learning at the end of a unit of instruction. The tools themselves are not forms of assessment, rather the way the teacher chooses to use that tool defines that type of assessment occurring.

Assessing Prior Knowledge

Prior to beginning a unit of instruction, it is essential the agriculture teacher identify what students already know or believe they know about the unit content. Conducting a preassessment or diagnostic assessment allows the teacher to collect such evidence to inform their planning of the unit, and also allows students to gauge their current level of understanding of the content. Many of the strategies utilized in a face-to-face setting can be accomplished using digital tools. For example, a common activating strategy is a KWL chart. Students fill in what they think they know about a topic in the "K" column, what they want to know in the "W" column, and then at the end of the unit or a portion of instruction, fill in the "L" column with what they learned. Without digital devices, this typically occurs on paper and the teacher captures student responses on a whiteboard or chalkboard. In a digital setting, the teacher could use a variety of tools such as Google Jamboard, Padlet, or Google Slides to capture student responses. Any of these collaboration tools allow participants to directly edit the KWL chart by adding their responses.

Formative Assessment

Formative assessment provides ongoing feedback to the instructor and students as to their progress toward the established learning goals. For quick checks of understanding, an agriculture teacher might choose to integrate questions throughout their lecture using programs like Nearpod or Peardeck.

Each of these programs has a variety of options for students to respond to prompts including multiple choice, short answer, click and drag, freehand drawing, and many more. The teacher might also choose to use an online quiz tool such as Kahoot!, Quizizz, or GimKit to integrate an element of competition into checking for understanding. Videos can be used to assess student learning using an online tool like Edpuzzle, in which teachers craft questions at key points throughout the video for students to respond to as they move through the video. Paper exit slips can easily be converted into digital exit slips by using Plickers or Google Forms. Often, the type of technology chosen by the instructor is influenced by compatibility with the operating system and technology requirements of their school.

Summative Assessment

Summative assessment of learning typically takes place at the end of a unit of instruction as the final opportunity for students to demonstrate their learning on a given topic. In a brick-and-mortar classroom, this often is a written test, but it can also include performance-based assessments such as a speech or presentation, demonstration of skill acquisition, case study analysis, or a project in which students apply their knowledge from across the unit to solve a problem. Many schools use test proctoring software when conducting summative assessments from a distance in an attempt to discourage cheating. When administering a digital test in person, teachers may have access to screen locking software that prevents students from clicking to other windows while completing their assessment.

To facilitate performance-based assessment, digital tools open up a plethora of options. Students might create digital portfolios of their work using Google Sites. The portfolio can be easily updated and shared throughout the year. This might be particularly useful for documenting flower arrangements, welds, or speeches. Digital cameras are often embedded in mobile devices such as smartphones and tablets. Students can use these cameras to document video evidence of their performing a specific skill and upload the video to the course LMS as a component of a summative assessment. Students might also create pamphlets or books using Book Creator, record a podcast, or write a blog to demonstrate their learning across a unit. The possibilities are endless!

REVIEWING SUMMARY

Advancements in technology and communication have drastically changed the way we live and learn. Digital technologies have opened up new possibilities for educators to connect students with their local and global communities, but they also need to be introduced to students as a powerful tool that they need to learn how to use responsibly and ethically. Although the students of today have always known a world where internet access and digital devices are ubiquitous, teachers should integrate opportunities for students to develop digital citizenship across their coursework. The ability to quickly connect with others around the world using these technologies serves to emphasize the need for students to also demonstrate global competence. Employers are increasingly desiring employees who are digitally and globally competent in addition to being well versed in subject-matter knowledge.

While digital tools have the ability to connect students with others, they also may be a source of inequity. When making decisions about which tools and strategies to use in classrooms, it is essential that agriculture teachers consider how they will ensure that the learning activities are accessible to students with disabilities and those who may not have regular access to the internet outside of school.

Technology should be purposefully integrated into instruction to advance student learning and skill development. The SAMR model is a useful tool for helping teachers determine how they can enhance or transform existing learning activities into those that utilize more digital technologies.

There are several terms used to describe learning with technology and internet connectivity. Digital learning uses the combination of internet-based technologies and other educational tools to broaden the ways that educators can customize instruction for students. Learning might take place from a distance through virtual instruction, in real time (synchronous) or on demand (asynchronous). Schools might plan for students to have e-learning days in which students complete planned learning activities from home using a one-to-one device. Blended learning approaches typically occur in person in a classroom, but elements of instruction may be self-guided using online resources. A flipped classroom model presents content to students outside of

class time and leverages face-to-face time with the instructor to conduct application and extension activities to enhance student comprehension.

Teaching in a digital world requires use of hardware and software designed to engage learners. Hardware such as one-to-one devices, cameras, and interactive whiteboards run software programs that help facilitate learning. More discussion of hardware found in agriculture classrooms can be found in Chapter 10.

Many of the same instructional and assessment strategies used in a traditional classroom can be converted or enhanced by digital technologies. Game-based learning, project-based learning, and scenario-based learning are all common approaches to engaging students in the content. Diagnostic, formative, and summative assessment can be accomplished using an array of online tools, many of which are available at free or reduced cost to educators.

Regardless of the learning environment, building positive relationships with students is essential to their learning experience. Frequent, positive, and honest contact with students in a virtual learning environment helps to foster positive rapport between instructors and students. Establishing norms and expectations in an online environment ensures clear communication between the instructor and students to enhance the flow of learning.

Digital technologies present novel opportunities for agriculture teachers to design meaningful, up-to-date instructional experiences that prepare students for our digital, globalized society. Not every technology needs to be used simultaneously, but those that are used by teachers should be carefully selected to enhance student understanding and learning performance.

QUESTIONS FOR REVIEW AND DISCUSSION

1. What is the role of technology in instruction? Should technology be used in every lesson?
2. How can agriculture teachers ensure the technology used in their courses is accessible to all students?
3. What are some examples of instructional technology that can be used in the classroom setting in agricultural education? The laboratory setting? When facilitating SAE projects?

4. What role do agriculture teachers play in developing digital citizenship and global competency skills in their students?
5. What is the difference between synchronous and asynchronous instruction? What are the advantages and disadvantages of each?
6. How can agriculture teachers ensure virtual learning is engaging from a distance?
7. How does your teaching philosophy influence the management of a classroom in a digital environment? How can you translate this into action?
8. How can an agriculture teacher ensure their course page in their learning management system is accessible to all?
9. How might a single digital assessment tool be used to diagnose prior learning, formatively assess learning in the moment, and be used as a summative assessment?

ACTIVITIES

1. Interview an agriculture teacher about their use of technology. What types of digital tools do they use to assess student learning? Do they have any particular tools they use in the laboratory setting that have enhanced student learning?
2. Explore various LMS companies such as Google Classroom, Canvas, Blackboard, Moodle, and Schoology. Compare and contrast the options available.
3. Become a Google Certified Educator or complete the Apple Teacher professional learning program.
4. Explore various learning technologies and create a chart that organizes them by use. Consider using categories such as discussion, collaboration, demonstration, content delivery, and assessment.
5. Using the *Journal of Agricultural Education, The Agricultural Education Magazine*, and the proceedings of the National Conference of the American Association for Agricultural Education, write a report on technology use in agricultural education. Current and past issues of these journals can be found in the university library. Selected past issues can be found online at www.aaaeonline.org or www.naae.org.

6. Using the SAMR model as a framework, retool an existing lesson or unit to integrate the use of technology.
7. Research how HyperDocs can be utilized in a blended or virtual learning environment. Convert student handouts into HyperDocs for future use.

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14

Classroom Management

TERMS

discipline
engagement
misbehavior
proximity control
punishment
restorative practice
reward
trauma-informed teaching

OBJECTIVES

This chapter addresses the National Quality Program Standards for Agriculture, Food, and Natural Resources Education (National Council for Agricultural Education, 2016), specifically Standard 1B: Program Design and Instruction. It has the following objectives:

1. Discuss unique attributes of agricultural education as related to establishing a quality learning environment.
2. Describe the characteristics of student behavior in a learning environment.
3. Identify practical approaches in student discipline.
4. Describe how to handle misbehavior when it occurs.
5. Identify student behavior trends in agricultural education.

The stories about Mr. "Hubcap" Williams are true and legendary (Croom & Moore, 2004). During a welding class, students in his class welded the tines of the garden tiller to a steel support post in the agriculture shop. When Mr. Williams tried to take it outside for use by his horticulture classes, he found he could not budge it. On another occasion, students took the agricultural mechanics textbooks in his classroom and sawed them in half using the table saw in the agricultural mechanics shop. On another occasion, students

locked him in the horticulture storage shed. The school custodian heard him banging on the shed's doors and released him after he had been locked inside for two hours.

Hubcap Williams acquired his nickname after some students put rocks in the hubcaps of his automobile. You can imagine the sound those stones made as Mr. Williams drove the car. He eventually sold the automobile after being unable to cure this apparent mechanical defect. The misbehavior of his students was a source of incredible frustration to Hubcap and led to many miserable days for him in the classroom.

Hubcap had an impressive reputation at his school. Students enrolled in his classes because they found it an easy period during the day when they could kick back and avoid strenuous mental activity. Hubcap did not put much effort into teaching. He would instead work on projects that struck his fancy. Frequently, class projects involved a few of the many students in his classes, leaving most students to find things to do to entertain themselves. Other students avoided his classes because they did not offer the challenge and rigor they desired.

Hubcap Williams was a real agriculture teacher and has long since retired from teaching. His name has been changed to protect his identity. Would you prefer to be a student in his classroom? Would you like to be his colleague, working in the same agriculture program?

CLASSROOM MANAGEMENT, AN OVERVIEW

The American people like their local schools, and they trust and have confidence in their children's teachers. But there are concerns. Bullying is becoming an issue of importance to parents who send their children to public schools, and there is increased concern about the use of tobacco, vaping, and drug use among students (Heller et al., 2020). These concerns demonstrate that agricultural education teachers must have the public's support necessary to create and maintain a positive classroom environment.

Classroom management starts with the environment the teacher creates in the classroom. Students require clear direction toward learning goals. The mechanism for achieving those goals is ***engagement***. Engagement occurs when students make a psychological investment in learning. The lessons

must be engaging and relevant to the interests of the students. Often, the instructor needs to help students see the connection between the lesson content and students' interests and experiences.

Students typically respond positively to routines and established norms for behavior in the classroom. Teachers need to develop those norms on the first day of classes and reinforce them throughout the academic year. The teacher communicates expectations to students through direct communication, such as "I appreciate how you went about starting on your lab assignment today" or "Thanks for cleaning up the lab area." The teacher sets the standard for behavior in the classroom, and their behavior should encourage students to perform their best (Marzano, 2017).

LEARNING ENVIRONMENTS IN AGRICULTURAL EDUCATION

The learning environment is large, complex, and reflects the society from which students come. School violence, the use of alcohol and illegal drugs, and sexual and racial harassment are widely discussed today. These and other student behaviors are not just in agricultural education classrooms but are school-wide. Educators must be aware of these issues as they go about establishing a learning environment.

The agricultural education classroom generally has multiple learning environments, including, but not limited to, standard classroom with desks, greenhouse, land laboratory, mechanics laboratory, and biotechnology laboratory. In addition, it may have storage areas, an instructor's office, and other facilities. These learning environments contain numerous industrial tools and equipment. They may contain hazardous materials such as compressed gases, fuels, paints, and pesticides. The key to managing these facilities is found in a sound classroom management plan. Box 14.1 identifies the elements of a positive classroom environment.

Student performance depends upon the level of expectation held by the teacher. A key in managing agricultural education is to establish and maintain a quality learning environment. The learning environment includes all the conditions that influence teaching and learning. Some environments promote learning; others may impair learning. The teacher's responsibility is to be in charge of the situation and establish a quality learning environment.

A teacher may use a classroom management plan based on the best practices of a quality learning environment.

Agricultural education may involve the use of power tools, chemicals, lab equipment, and many other potentially hazardous devices and materials. Misbehaving students could seriously injure themselves and others around them. Teachers should develop organizational skills and lesson plans that minimize the risk of injury to students.

BOX 14.1 *Positive Classroom Environment at Multiple System Levels*

The School

School-wide rules are clear and developed with student and teacher input.

School administrators support teachers in the application of school-wide policies.

School officials conduct in-service training and staff development that help teachers develop positive classroom environment strategies.

In the Agricultural Education Classroom and Laboratory

Classroom and laboratory rules are posted and referred to frequently.

Exceptions to classroom and laboratory rules are clearly explained.

The room is organized and arranged to allow for efficiencies in student movement and learning.

Lessons should be well planned, interesting, and engaging to learners.

Support structures should be in place to allow extra assistance for students experiencing difficulties concerning learning.

The Agriculture Teacher

A teacher's language should be clear, and positive, and free of labels.

A teacher's feedback should be based on performance rather than student characteristics.

The teacher should provide a clear explanation of tasks and assignments and behavioral and learning expectations.

The teacher should develop a system for creating a meaningful dialogue with students on items of mutual importance.

Teachers should practice empathy and work to develop positive relationships with students based upon respect and trust.

Teachers should look for opportunities to give praise.

System-Wide Responses to Student Behavior

Appropriate behavior should be rewarded or reinforced through effective communication strategies between the student and teacher.

Teachers should use low-level and discreet strategies for dealing with inappropriate behavior before it reaches the stage of disrupting the whole class.

Serious misbehavior is dealt with seriously and promptly.

Furthermore, students come into agriculture classes with varying degrees of skill in the agricultural sciences. Some students have experience with the proper use of tools, equipment, and chemicals, while others have no experience in these areas. Some students have in-depth knowledge of some agricultural subjects but very little knowledge of others. For instance, the student who is an expert welder and machinist may not have much skill in handling livestock.

Laboratory work involves a significant amount of psychomotor ability, and students must be taught how to work safely and follow procedures. The hands-on nature of agricultural education demands much attention to the development of new psychomotor skills in addition to cognitive and critical-thinking skills.

Agriculture classes are elective courses. Students may enroll in these courses because they are personally interested in the subject matter. However, most experienced teachers recognize not every student who enrolls does so because of a deep personal interest in an agricultural career. Some students take the courses because they have a nominal interest in agriculture and wish to explore further. These students can either become more interested in the subject matter or lose interest as the courses progress.

Some students take agriculture courses to avoid other required subjects or because they need additional electives to graduate. Sometimes, administrators and guidance counselors place students in agriculture classes without regard to their career interests. Whatever the method by which students arrive in the classroom, the possibility exists that student behaviors could disrupt the learning experiences of other students.

It would be an error to assume that discipline and classroom management are what teachers do to get the lesson accomplished and the content delivered. Maintaining a positive learning environment is more than an ancillary duty; it is part of the learning process itself. The teacher who understands the psychology of learning and human growth and development processes at the adolescent and preadult stages can effectively help students make the right choices regarding their behavior.

MISBEHAVIOR IN THE CLASSROOM

Misbehavior is the condition that results from a person's inappropriate attempt to solve a problem or adapt to a situation (Maslow & Frager, 2003). This inappropriate coping behavior is purposeful and motivated. It is often a learned response to conditions in the student's environment. In Maslow's words, "It is an attempt to make up for internal deficiencies by external satisfiers" (p. 132).

Students express coping behavior in several ways. For instance, a student coping with a need to be part of a group might misbehave to gain acceptance from their classmates. Another student who works a part-time job well into the late evening hours may cope with a physiological need for rest through frequent absences from school (Dahl, 1999). When the coping mechanism violates social norms within the classroom and school, it becomes misbehavior (Croom & Moore, 2003).

Working through the problems associated with misbehavior in the classroom is an essential part of teaching. However, teachers rarely communicate among themselves in any depth about the subject of student misbehavior even though the stress generated by misconduct is a more significant concern than problems with other working conditions (Abel & Sewell, 1999).

FIGURE 14.1 What features do you see in this learning environment? Are students demonstrating on-task behavior?

How would you respond?

Ms. Mary Jackson sat at her desk grading the last of the animal science unit tests. The last test she picked up to grade belonged to Jeff Wright. Immediately, she noticed most of the questions on the test were unanswered. Ms. Jackson put down the paper, picked up the grade book, and found Jeff's name in her second-period class. Except for a few directed lab exercises where he worked with a partner, Jeff had few grades to show for his efforts. She picked up her test and walked to the next-door classroom to speak to her teaching partner, Tom Davis.

"Tom, did you have Jeff Wright in class last semester?"

Tom looked up from his paperwork and replied, "I sure did. Do you have him this term? I'll bet I know why you are asking about him."

"Yep, I have him in the animal science class this semester. How well did he do in your class?" asked Ms. Jackson.

"Not good at all. It was the introduction to agricultural science class, and Jeff barely made a D. He's not a great student," said Mr. Davis.

"What's the deal with Jeff, then?" asked Ms. Jackson. "How can I get him engaged in this class? Every day he falls farther and farther behind. He doesn't bring a notebook to class, asks no questions, and often tries to sleep while I am teaching. I have to stay on him to keep his head up off the desk."

"How do the other students act around him?" asked Mr. Davis.

"See, that's the interesting thing. When the other students are engaged in what we are doing, Jeff just sits there like a bump on a log during labs. He doesn't communicate well with the other students," explained Ms. Jackson.

"What are you going to do?" asked Mr. Davis.

"I don't know, but if I don't do something soon, he is going to fail my class," replied Ms. Jackson.

• • •

This misbehavior is a common experience for teachers. How would you address the problem Jeff is having in this class?

Questions for discussion

What misbehaviors do you notice in this scenario?
What do you think is the origin or cause of Jeff's behavior?
How should the instructor respond to the misbehavior?

Because teachers spend much of their workday almost exclusively with pupils, they tend to formulate their own definition of misbehavior and handle misbehavior accordingly (Borg & Riding, 1991). Thus, there is a wide range of behavioral modification techniques used to redirect or repress misbehavior.

Several studies have addressed student behavior in agricultural education. Most found student attitude and disposition toward schooling was a significant factor in misbehavior. Furthermore, the ambivalent attitude of students, students being poorly prepared for class, and a general negative student attitude were the most frequently cited behavioral problems (Burnett

& Moore, 1988; Camp & Garrison, 1984; Croom & Moore, 2003). Some students develop a dislike for schooling. Their attitude carries over into the thoughts, feelings, and reactions they have related to the efforts of instructors to teach them. In the agricultural education program, the task is to provide conditions under which student interest remains high. The effective agriculture teacher constantly seeks effective methods to keep student learning at the highest possible level. Box 14.2 identifies environmental variables that may influence student behavior.

BOX 14.2 *Environmental Variables Influencing Student Behavior*

The Student
Socioeconomic status and family structure
A disposition toward school and learning
General physical and mental health
Dietary habits and sleep patterns
Level of interest in the class or subject matter
Learning style
Effect of peer pressure

The Teacher
Teaching ability
Knowledge and expertise in student behavior management
General physical and mental health
Dietary habits and sleep patterns
Personality
Quantity and quality of student supervision
Organization of instruction and quality of curricular planning
Teaching methods employed

The Rest of the Class
Time of day
School activities (prom day, last day of school, other special activities/events)
Size of class
Peer pressure
Subject matter or teaching method employed

The Teaching and Learning Facility
Cleanliness of the facility
Size of classroom
Student desk style, arrangement, and quantity
Adequate lighting in the classroom and lab environments
Safe use and maintenance of lab equipment
Space for students to sit and move about the classroom

Ambient air temperature of the classroom and labs
Ambient noise in the classroom
Organization of learning materials and resources
Adequacy of personal protective equipment
Frequency and intensity of external interruptions of a lesson in progress by announcements from the public address system, classroom visitors, classroom telephone interruptions

Sources: DeBruyn (2011); DeBruyn & Larson (2009).

DISCIPLINE VERSUS PUNISHMENT

The word ***discipline*** is derived from the Latin *disciplina*, which means "to teach," and the Latin *discipulus*, which means "pupil" (Oxford University Press, 2000). Educators view discipline as authoritative control of behavior through punishment and rewards. It is related to the kind of behavior students need to express to make learning meaningful.

Punishment and rewards are discipline functions and are often used to encourage students to learn new choices in personal behavior management. ***Punishment*** is the administration of a penalty or undesirable action designed to discourage socially unacceptable behavior.

A ***reward*** is a pleasant or satisfying consequence of an action. The goal of giving a reward is to gain desired behavior. Rewards include allowing a student to be first to perform a desirable task, awarding a small prize, placing an individual's name on the honor roll, and using other means viewed as favorable outcomes.

Perhaps, at this point, it is necessary to define misbehavior further. Misbehavior is any behavior that is inappropriate for the moment. For instance, certain classroom activities may require students to stand up and move about the classroom, and that might be acceptable behavior at the moment. However, at other times, it is the instructor's wish that the students remain seated and attentive to a lecture. Standing up and moving about the classroom then becomes misbehavior at that moment.

It is crucial to see misbehavior as an individual choice. Teachers perceive misbehavior as something that a student does that directly and adversely affects others in the classroom. Misbehavior is a choice individual students make, and teachers should view it as such. For instance, the student who has

her head down on her desk and is sleeping during a lecture period may not be disturbing other students, but this behavior is inappropriate. It should receive some corrective attention from the teacher.

FIGURE 14.2 Students in agricultural education programs use tools and equipment that could cause injury if misused. There is little room for misbehavior in the agricultural lab setting.

THREE VARIABLES OF A DISCIPLINE PROBLEM

DeBruyn (2011) found three variables (the student, the teacher, and the class) are present in almost every discipline problem. These variables determine the frequency, intensity, and duration of misbehavior. Further, these three variables influence the type of misbehavior that occurs.

The Student

A student's behavior could change from socially acceptable for the classroom into misbehavior on any given day and in any given situation. As human beings, students are often influenced or motivated by certain external factors in their environment. A student who did not get enough sleep the night before is going to be sleepy in class. The student who failed to eat a nutritious breakfast might be passive in class, or the student who consumed too many caffeinated soft drinks and energy drinks might be restless and excited. Student behavior is likely to be different on the day of the school prom than on an ordinary school day. The experienced teacher can frequently determine the type of behavior students will exhibit by observing them as they come into the classroom. A primary goal should be to help students practice self-discipline and exercise self-control.

The Teacher

Misbehavior is an individual choice, but the teacher may play a role in whether or not misbehavior occurs. The teacher sets the tone and pace of the class and exerts a significant influence over students. Therefore, the teacher's actions may influence student behavior either positively or negatively. The following is an example of how a teacher can negatively affect student behavior. A student puts his head down on his desk and falls asleep during class, missing important content and concepts. The teacher notices the behavior but fails to wake the student or somehow intervene in the behavior. In this case, the teacher is contributing to the misbehavior.

FIGURE 14.3 The dynamic presence of the teacher in the classroom mitigates many misbehavior problems.

Classroom management is an integral part of having a good learning environment. The teacher's presence in the classroom or the supervision of students during lab activities is a significant factor in student behavior. Teachers who are constantly supervising students and directing their behavior generally have fewer behavioral problems.

The Class of Students

The third factor in student misbehavior is found in the actions of the class as a whole. Students need to be accepted by their classmates. Moreover, they have a strong need for belonging in the sense of acceptance by the group members. Therefore, students will often act in a manner that brings admiration and attention to themselves, even though their actions are misbehavior.

Furthermore, this need for belonging and safety is so strong in students that their response to corrective action by the teacher often leads to an escalation of misbehavior. For instance, the disciplined student often becomes defiant and argumentative with the teacher. That very same student might be altogether different and exhibit more socially acceptable behavior

in a private student–teacher conference. Effective teachers recognize they greatly influence student behavior.

The easiest variable to control is the teacher's behavior. A teacher is responsible for attempting to diagnose the problem and adjusting instruction and interaction with students to help students make the right choices about socially acceptable behavior. Recognizing and coping with student misbehavior is an essential part of instruction. The beginning teacher must develop tools for effectively dealing with behavior.

CONDITIONS THAT PREVENT MISBEHAVIOR

One of the best methods of managing student misbehavior is to minimize opportunities for it to happen. The effective agriculture teacher recognizes the conditions that may cause mischief and modifies the instructional environment so misbehavior cannot flourish. For instance, the teacher can often improve student behavior simply by reorganizing the seating arrangement in a classroom. To prevent students from mishandling shop tools, the teacher can establish procedures by which the tools are locked in the tool room when not in use. If students appear sleepy and unfocused during class on a warm day, the instructor can modify instruction to engage the students in activities or movement. In some cases, simply changing the air temperature in the classroom can be conducive to good student behavior. A classroom that is too warm or too cool can discourage student participation.

Effective teachers know their students well enough to identify uncharacteristic behavior. It should be easy for a teacher to spot the behavior of students who come to class angry, worried, or excited about some prior experience. By adjusting the lesson, the teacher can minimize inappropriate student behaviors in the class. The angry student could be pulled aside for a private conference with the teacher. By listening to the student's problem and offering constructive solutions in a nonthreatening manner, the teacher might defuse that behavior before it affects the whole class. The key is to remove as many distractions from the learning environment as possible.

Have a Well-Prepared Lesson

Good preparation by the teacher helps prevent many misbehavior problems. With good planning, the learners are engaged and active. Busy learners do not have the time to contemplate misbehavior.

A well-prepared lesson plan promotes student learning. The single most effective method for preventing misbehavior is to have a well-prepared, well-executed lesson delivered enthusiastically. Realistic, relevant lessons, presented interestingly, will engage the students inclined not to misbehave. When planning a lesson, the teacher needs to think like a student but act like a teacher. Answer the question, "How can I plan this lesson so it is interesting to the students and meets their needs?" The same things that motivate adults also motivate students. Attractive visuals, exciting demonstrations, and real-life applications of learned skills are all things that encourage adults. These same methods also engage student interest.

Through careful planning, the agriculture teacher can usually find a way to engage students in the lesson. Teachers can find unique ways to keep students involved in a class by using their creative talents, even when resources are limited. For example, a teacher is planning a lesson on taking a soil sample. The least preferred method is for the teacher to teach the use of the soil probe to students one at a time. Invariably, while the teacher is showing one student how to collect a soil sample effectively using the soil tube, the remainder of the class is talking, joking, or wasting time.

A more effective method for teaching this procedure would be this: The teacher gives each student a shovel to collect a soil sample. Most homeowners do not own soil tubes for taking soil samples, but they would have shovels to help complete the task. The teacher demonstrates the procedure to all students and then assigns them to practice the skill under supervision in a suitable location. Thus, students learn the technique for taking soil samples promptly.

By developing instructional activities that engage all students in a lesson, the instructor can prevent misbehavior while using instructional time more judiciously. The best defense against student misbehavior is a well-planned and well-executed lesson.

Teach the Entire Period

Making full use of class time is a companion to good instructional planning. Student teachers are often surprised at how quickly they execute their

prepared lessons. They are at a loss about what to do with the extra time remaining at the end of the class period.

Do not allow dead time in a lesson. The students should be working and thinking throughout the entire class time. It takes less effort and causes less aggravation to prepare and deliver a lesson that engages the students for the entire class period than it does to constantly chase down and discipline students who have been given too much free time. Students dislike being bored. Lessons that are irrelevant to students' interests and needs, not well planned, or tedious lead to student disengagement with the lesson. When this occurs, learning takes a backseat to other things students might do to amuse themselves. By engaging students in learning for the entire class period, the teacher can control student behavior in the best possible manner.

A matter of time

If a teacher allows a class to have 10 minutes of free time at the end of a class period, that adds up to approximately 15 hours of free time by the end of the semester and 30 hours of free time by the end of the school year. If the average instructional day is 6 hours long, that equals five school days of free time for students.

Consider the amount of instruction lost in those five school days, and the opportunity cost of this lost instructional time.

BOX 14.3 *Sample Bell Ringer Questions*

- What are the six classes of nutrients in livestock feed?
- Of the four pines we identified yesterday in class, which ones are naturally adapted to drier sites and naturally found to grow in wet soils?
- How many uses of the peanut can you list? How about cotton?

Use Interest Approaches

Teachers should use a focusing activity at the beginning of a lesson. The activity should direct the attention of the students to the lesson at hand. Before that, "bell ringer" activities should be available for students as they enter the classroom (see Box 14.3). This activity usually consists of a

question or statement written on the chalkboard/whiteboard at the front of the classroom. Students should enter the classroom, get their materials ready, and respond to the question or statement on the board. The bell ringer is an excellent method for reviewing at the beginning of a class, and it folds nicely into a more elaborate interest approach as the teacher begins to teach. Students should have something positive and constructive to do the moment they enter the classroom.

Box 14.4 provides three examples of interest approaches to lessons to gain students' attention and develop a genuine interest in the subject.

BOX 14.4 *Three Examples of Interest Approaches*

Interest Approach #1
Lesson: "Grafting With Skill"
Class: This is a Horticulture 2 class with 20 students.
Interest approach:

1. Bring in a bag of white seedless grapes and a few cut-up Red Delicious apples.
2. Share these with the students and ask them to identify what they are eating. Ask if they have ever eaten these items before.
3. Draw on their previous horticulture experience by asking them to find the seeds. (*Note*: They may or may not be able to find seeds in the Red Delicious apples.)
4. Ask them how many have apple trees at their houses or their grandparents' houses. Explain that the seeds in the apples will not produce more Red Delicious apples.
   a. Ask: "Since there are no seeds, how do we get more seedless grapes?"
   b. Ask: "If we don't get more Red Delicious apples from the seeds, how do we get more?"
   c. Ask: "What DO we get if we plant the Red Delicious apple seeds?"
5. Begin the discussion of grafting.

Interest Approach #2
Lesson: "Understanding Plant Terminology"
Class: This is a Horticulture 1 class with 25 students.
Interest approach:

1. Give each student a flower and a large piece of paper. Tell the student to sketch the flower and write down the name of each part they recognize.
2. Ask each student to identify their flower. Allow the student to identify someone else's flower with which the student might be familiar. Have a few students share their specified drawings.
3. Display a list of plant terms.
   a. Ask: "Who can identify a term from the screen?"
   b. Ask: "What is a calyx, what is a corolla, and how do you tell the difference?"
   c. Ask: "How many of these terms apply to the flower in front of you?"
4. Begin the discussion and definition of the plant terms.

Interest Approach #3

Lesson: "Identifying Plant Pests"
Class: This is a Horticulture 1 class with 25 students.
Interest approach:
Bring in a display of plant pests that include leaves with fungus and disease, plants damaged by whiteflies and aphids, and weeds such as morning glory or stinging nettle. You may also include some pictures of mammals, such as whitetail deer. Altogether, there should be about 10 specimens. Have students observe the specimens and describe what they see. Lead from this discussion into the presentation of the objectives for the lesson. Begin covering the content for the first objective.

Develop Classroom Routines

Routines are force multipliers. Routines operate in the background of a person's mind without much conscious thought. This frees the brain to focus on other things. On the first day of class, the teacher should explain the classroom rules and procedures for students to follow. Then, the teacher should firmly adhere to those policies to establish a routine for the students. For example, some teachers have a station set up with typical classroom materials such as scissors, tape, markers, colored pencils, glue, and paper. Students who need those materials go directly to the materials station without delay, preventing the teacher from being inundated with requests for those same materials during a class activity.

FIGURE 14.4 The table arrangement facilitates student discussion, as opposed to lecture. Notice there is room for the teacher to circulate between tables to monitor student performance.

Teachers should also post their classroom rules in all instructional areas for students to see. Here is a sample of classroom rules:

- Be seated and have materials ready for class before the tardy bell rings.
- Respect the responsibility of the instructors to teach.
- Respect the rights of your fellow students to learn.
- Be kind and courteous to visitors.
- Make up work after an absence.
- Keep work areas, desks, and tables clean.

WHEN MISBEHAVIOR HAPPENS: SOME GENERAL GUIDELINES

What should be the teacher's response to misbehavior when it happens? Invariably, teachers will be confronted with some type of student misbehavior during the school day. All teachers are responsible for all of the students all of the time.

During the Lesson

Misbehavior during a lesson is particularly disruptive to both teaching and learning. One mistake a new teacher often makes is attempting to ignore misconduct by continuing to teach. If students are talking, the teacher will try to speak louder to drown out the students. This procedure is both ineffective and exhausting for the teacher. The teacher can use their silence, posture, positioning in the room, and "teacher look" to quiet students and then resume instruction. Again, the use of interest approaches and high-quality lessons will negate a large portion of the discipline problems in a class.

Handle class disruption and misbehavior quickly and decisively. Keep teaching, but use gestures and eye contact to communicate messages to the misbehaving student. If the misbehavior continues, try to deal with the student privately. A public reprimand will often result in a public spectacle. If the student fails to heed the teacher's warnings, the teacher should follow the procedure outlined in the school handbook such as assigning detention or sending the student to the school disciplinarian. The key is to be consistent, decisive, and task-oriented.

Proximity Control

One effective method for encouraging good student behavior is moving around the classroom, observing students working. Whenever a student is misbehaving, the misbehavior is often curtailed by the proximity or presence of the teacher. ***Proximity control*** can shape student behavior by being close to the student in the classroom or laboratory area. The teacher need not say anything to the student, and often the simple presence of the teacher will cause the student's behavior to improve.

An additional benefit of moving about the class is that the variation of the teacher's location relieves student boredom. If the instructor stands for long periods in the same spot, habituation sets in, and the students lose focus and attention. By moving around the classroom, the teacher breaks the monotony of the environment and causes students to remain attentive.

FIGURE 14.5 Brief teacher–student conferences out of earshot of other students can identify and resolve minor misbehavior problems.

Setting an Example

Teachers must be good, professional role models for students. They must refrain from acting in a manner that encourages misbehavior. Teachers who fail to follow classroom rules are setting a poor example for the students to follow. Middle school and high school students have a keen sense of fairness, and they resent actions by the teacher that show a disregard for the rules. For example, the teacher who sends students to the school office for carrying knives on campus will be looked upon poorly by students if that teacher continues to carry a pocket knife. Teachers who are following their own rules are good role models of self-discipline for students.

Use Restorative Practices

Some school systems still operate under the practice of punishing student misbehavior and then moving on without dealing with the causes of the misconduct. However, this practice has come under increasing public scrutiny.

Students who are misbehaving may be doing so as a reaction to poor academic performance. Students who are routinely absent from school feel alienated from their peers. Zero-tolerance discipline procedures are draconian at best and cause emotional stress and frustration for all involved. At their worst, zero-tolerance discipline procedures exacerbate existing racial, ethnic, and socioeconomic inequalities. Students who misbehave in a

zero-tolerance environment may escalate their behavior out of frustration or embarrassment. Severe punishment that removes students from the learning environment without restorative practice damages the student–teacher relationship.

The 2000 report of the American Psychological Association Task Force on Zero Tolerance found zero tolerance for misbehavior that does not present a threat to safety was indeed harmful to the adolescent learner's social, emotional, and cognitive development (American Psychological Association Zero Tolerance Task Force, 2008). A better option is ***restorative practice***, which is restoring the school or classroom community by performing service.

The School Community and Restorative Practices

One method for dealing with misbehavior is to involve the school community in the righting of the wrongs committed. Whenever a wrong is committed in a school's social environment, everyone affected by the misbehavior contributes to acknowledging the problem and has a stake in its remedy. Students who misbehave must restore the community to the status quo by performing helpful community service. Some schools use peer juries to recommend the best course of restoration.

Prevention of Misbehavior in a Restorative Practices Model

An ounce of prevention is worth a pound of cure. Misbehavior can be prevented through several strategies. These include

- Teaching students how to resolve conflict proactively
- A peer mediation program that helps students work through conflict
- Utilizing a multiprong approach that incorporates a variety of restorative practices consistently and purposely

Restorative Practices in the Agriculture Class

One form of restorative practice is restorative justice—the process of righting wrong behavior and repairing the harm done. An example of restorative justice for a student with excessive absences from school might be

- The student spends time after school catching up on work missed.
- The teacher connects with the student's parents to develop solutions to mitigate excessive absences in future.
- Periodic student–teacher conferences are scheduled to measure progress and academic achievement.

The focus of restorative justice is less about stopping the behavior and more about addressing the harm done by the behavior.

The First Class Meeting

A teacher's expectations should be made known at the first meeting of a class. By doing so, students understand the kind of behavior they must exhibit. It is far easier to have a good learning environment from the beginning than it is to try to impose it later. Here are some things to do at the first meeting of the class:

1. Inform the students of your philosophy of teaching and learning. Take the time necessary to explain how you plan to teach, what you plan to teach, and why you will be teaching it. Students will understand very clearly the teacher's commitment to teaching.
2. Explain the general rules of conduct for students in the class. Take the time to explain why these rules are essential.
3. On the first day of class, teach something from the content area. Do more than just distribute the syllabus and go over classroom rules. Set the tone and pace of the course the very first day by committing to teach some agricultural subject matter.

Avoid Disruptions

The purpose of misbehavior with some students is to cause the teacher to stop teaching. It is in the teacher's best interest to thwart those efforts to stop instruction. Continue to teach if at all possible. Use proximity control to manage student behavior while continuing the forward motion of the lesson. Handle discipline issues quickly and quietly if possible so the lesson keeps moving. Do not give the misbehavior more attention than necessary.

Under no circumstances should the teacher shout or lose their temper in class. When teachers lose their tempers, they may resort to bullying to get

the students to behave. Students may consider the ranting and raving teacher to be a form of amusement. If a student chooses to argue with you over a discipline issue in the classroom, defer it until after class or meet briefly in private outside of class.

Follow School Policies

A teacher should know and follow the policies of the school on student misbehavior. Use only school-sanctioned means to correct student behavior. To do otherwise could cause harm to the student and, subsequently, lead to a teacher's dismissal for administering inappropriate discipline measures.

Make sure administrators are familiar with and approve of the classroom behavior plan. Ask administrators to help you find ways to engage problem students productively in the classroom. It is better to ask administrators to assist you in preventing misbehavior than to send students to the office for the school disciplinarian to handle. Good administrators appreciate a proactive approach to discipline and will applaud the teacher's efforts in keeping students in class and on task.

Communicate With Parents

Teachers should contact parents when student misbehavior reaches the point where some intervention is necessary. Teachers should seek to balance their communication with parents by reporting student success when it occurs. Otherwise, contacting parents only when the students misbehave creates an antagonistic relationship between parents and teachers. Ask parents to help you with discipline issues and keep them informed of their children's academic performance. Try to solve problems before they become serious issues.

Handle Misbehavior With Finesse

If a teacher notices misbehavior, they should confront the student about the behavior and appropriately handle it. Under no circumstances should a teacher ignore misbehavior simply because it is not happening in their assigned work area. Student behavior is a shared responsibility between parents, students, and all teachers. Effective schools create the mindset that there is no safe place on campus for misbehavior.

FIGURE 14.6 On-task behavior is an integral part of the learning environment. Do you consider this to show misbehavior?

Organize the Learning Environment

The physical environment in which students learn is an essential factor in preventing or encouraging student misbehavior. The arrangement of student desks can either alleviate or contribute to student misbehavior. Where the teacher is the primary focus, the students' desks should face the teacher. Students should have adequate desk space for writing in their notebooks. If the primary method for the lesson requires student discussion, then the desks should be arranged to allow student groups to discuss the topic comfortably.

It is good to modify instruction to use various teacher-centered, social interaction, and student-centered instructional methods. To help ensure the success of these methods, the instructor will need to modify the seating arrangement. Simply rearranging student desks can clear up minor misbehavior problems. (See Figure 14.7 for two arrangements.)

What would you do in this situation?

Joanne entered the classroom just as the tardy bell rang, engaged in a loud argument with another student. Upon seeing Mr. Williams, the agriculture teacher, she immediately stopped

arguing and loudly proclaimed, “Hi, Mr. Williams. My favorite teacher in the whole world!”

Joanne was a junior in Mr. Williams’s horticulture class. Joanne has been a challenging student to teach because she often argues with her teachers and other students. She is frequently late for class, rarely turns in assignments on time, and usually asks inappropriate questions or uses crude or unsuitable language. Her relationships with other students are strained at best.

“Hello, Joanne, please take a seat so we can get started,” replied Mr. Williams.

“I would, but Tom is in my seat again! Boy, you had better move before I — “ said Joanne, getting ready to take a swing at the student.

“Hold on, Joanne, take any open seat. The late bell has rung, and class has started.”

“Okay, I’ll take your seat then,” replied Joanne, as she sat down at the teacher’s desk.

“Nope. Not that one, a regular student desk,” replied an exasperated Mr. Williams.

“You said to take any seat,” said Joanne. Several students laughed at Joanne’s response.

“You know which seats you are supposed to sit in, so let’s get moving,” said Mr. Williams as he moved to the front of the class to begin the lesson.

“Today, we are examining the growth and development of …” began Mr. Williams.

While moving to a student desk in the back of the room, Joanne loudly interrupted her teacher again. “Are we going out to the greenhouses today?”

“Joanne, you know the rules. Raise your hand if you have a question,” replied Mr. Williams.

Joanne, still not in her seat at the back of the room, scowled and crossed her arms. “It was just a simple question,” she responded, throwing down her school backpack and falling into a student desk at the rear of the class.

• • •

This scenario plays out every day in schools. Your response in this situation can mitigate student misbehavior or cause it to escalate into more severe misconduct.

Questions for discussion

What misbehaviors do you notice in this scenario?

What do you think is the origin or cause of Joanne’s behavior?

Which responses by Mr. Williams have been successful in helping Joanne manage her behavior?

How might the instructor respond more effectively to the misbehavior?

How might you employ restorative justice measures in this situation?

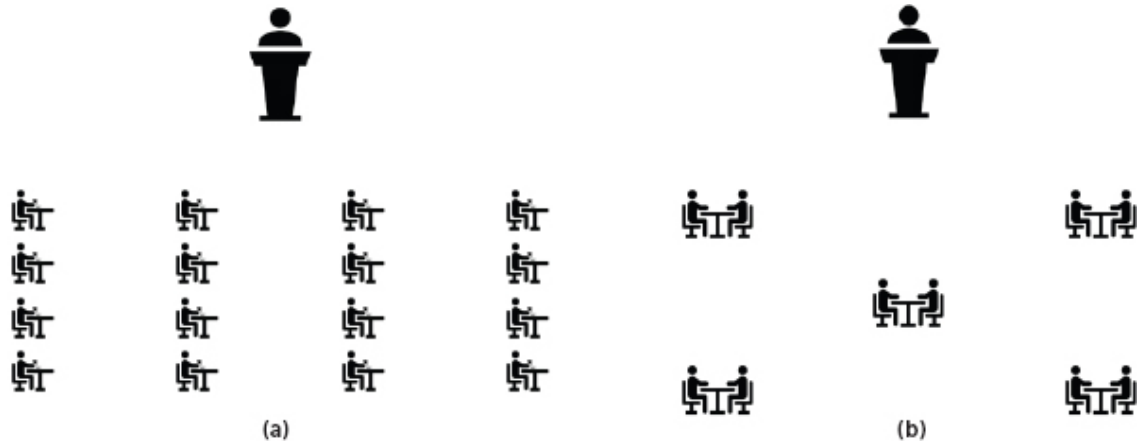

FIGURE 14.7 Classroom desk arrangement for (a) a presentation (lecture) and (b) small group discussion and activity.

Develop a Laboratory Safety Plan

Because an agriculture teacher usually manages a laboratory, a lab management plan is necessary. There are three essentials for effective shop or laboratory management.

1. Position yourself in the laboratory so you can observe all students working. Be where you can visually locate each student in the class with a minimal degree of effort. If the students are aware you monitor their actions, they should be less inclined to misbehave. Be highly visible in a shop or laboratory setting so students can get answers to questions and assistance on projects.
2. Securely store unused tools and materials out of the reach of students. Securely store agricultural chemicals, fuels, paints, glues, and other toxic substances to prevent accidental exposure. By following the same procedure for infrequently used tools, equipment, and supplies, you will ensure these will be available for use the next time.
3. Keep all tools and equipment in safe working order, with all guards and shields in place. Broken equipment or equipment without the necessary safety guards is a severe safety hazard. This equipment should be tagged and locked out of service and repaired at the earliest possible opportunity.

TRAUMA-INFORMED TEACHING

Trauma is one of the most prominent public health issues in the United States (Felitti et al., 1998). Students cannot learn well if they experience concerns about their safety. Traumatized students have suffered through an alarming, inadequately resolved experience, such as experiencing violence, neglect, natural disaster, or abuse. Traumatic experiences are difficult for adults to cope with, but trauma is keenly felt in youth. They do not yet have the positive coping mechanisms necessary to deal with trauma.

Trauma-informed teaching requires teachers to anticipate unexpected behavior from students and respond to reduce the student's anxiety and stress. A student's sudden spontaneous emotional outburst in the middle of classroom activity can be problematic to teachers and classmates. Teachers should prepare to deploy strategies that help defuse traumatic responses in class. This may include giving students extra time to comply with requests, handling misbehavior issues discreetly and out of earshot of other students, and maintaining a calm and poised demeanor.

Students suffering from trauma often dwell on the negative. Teachers can employ strategies that disrupt negative self-talk by distracting students by transitioning from one activity to the next. Teachers can also provide supportive feedback designed to counter negative thinking, such as using praise, maintaining a calm demeanor, and refusing to argue with the student.

Overall, the teacher can defuse some of the stress students experience by using positive reinforcement, using praise to recognize performance, and maintaining an inviting and cheerful classroom (Minahan, 2019).

REVIEWING SUMMARY

The learning environment is the nature and quality of the conditions in which teaching and learning occur. Some environments promote learning; others may impair learning. The teacher's responsibility is to be in charge of the situation and establish a quality learning environment.

Misbehavior may occur in several forms. Sometimes it does not disrupt the learning environment beyond the student involved in something that

detracts from learning. Misbehavior is the condition that results from a person's inappropriate attempt to solve a problem or adapt to a situation.

Discipline is the authoritative control of behavior by using punishment and rewards. Some individuals feel it is more critical to stress establishing and maintaining a quality learning environment. Discipline tends to create negative emotions about education and the processes involved.

Three variables in a behavior problem are the student, the teacher, and the class of students. These three create an environment in which teachers and students carry out the learning process.

Prevention of misbehavior is by far the preferred approach. Teachers can use practices that promote desired behavior. Having well-prepared lessons that engage students is among the first steps. The furniture arrangement in the classroom can enable students to be more engaged with the lesson. A teacher should teach the entire period and not have unused time at the end. Robust interest approaches help engage students and motivate them to learn what is being taught. Having classroom routines and safety plans also promotes a good learning environment.

Teachers must appropriately respond to misbehavior situations. It is best to avoid disrupting a lesson and the learning that is occurring. Proximity control is a valuable strategy. Present behavioral expectations during the first meeting of the class. Once learners know expectations, they are more likely to follow them. Always follow school policies. Get to know parents and involve them in your program.

QUESTIONS FOR REVIEW AND DISCUSSION

1. What is the "learning environment"?
2. What are the features of learning environments in agricultural education?
3. What is misbehavior? Why is misbehavior said to be a "coping mechanism"?
4. What are the three variables in a discipline problem? Briefly describe each.
5. What is "restorative practice" in education?
6. How do well-prepared lessons minimize student misbehavior?

7. How should a teacher organize a classroom to minimize misbehavior?
8. What is trauma-informed teaching?
9. What classroom rules may help establish a good learning environment?
10. What should be a teacher's response when misbehavior happens?
11. What is proximity control? How is it useful?
12. Why is it beneficial to make expectations known during the first meeting of a class?
13. How can working with parents help minimize misbehavior?

ACTIVITIES

1. This activity focuses on quality learning environments as related to student achievement.
   a. Goal: Identify principles and teaching strategies that yield good classroom and laboratory management results.
   b. Procedure: Observe a teacher at work in a local agriculture program. Do not participate in class discussions or activities. Observe how the teacher manages the classroom or laboratory during the class period and complete the following assignments:
      i. Draw a diagram of the classroom or laboratory setting in which you observe the teacher. Write a paragraph describing positive and negative attributes of how the classroom or laboratory is organized. Determine the mode for which the furniture is arranged: lecture mode, small-group mode, demonstration mode.
      ii. Observation: Managing student work—Describe how the instructor grades student work. What are the procedures performed by the instructor to account for absent students? How does the instructor arrange for student work to be made up after an absence?
      iii. Observation: Managing instruction—Describe how the instructor keeps students focused on instructional activities and communicates what is expected. Also, include an analysis of the efficiency of the lesson (how time and other resources are managed).
      iv. Observation: Managing special groups—Describe how the instructor manages instruction for students of varying ability levels. Evaluate the effectiveness of these methods.

v. Synthesis: A final question—Who worked harder today, the students or the instructor? Why?

2. Read peer-reviewed articles on trauma-informed teaching. What elements of the reading can you employ in the classroom when you begin your career as a teacher?

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15

Agricultural Literacy

TERMS

agricultural awareness
agricultural literacy
agriculture
Agriculture in the Classroom
American Farm Bureau Foundation for Agriculture
infuse
literacy

OBJECTIVES

This chapter addresses the National Quality Program Standards for Agriculture, Food, and Natural Resources Education (National Council for Agricultural Education, 2016), specifically Standard 1A: Program Design and Instruction — Curriculum and Program Design. It has the following objectives:

1. Explain the meaning and importance of agricultural literacy.
2. Explain National Agricultural Literacy Standards and how they are used.
3. Describe strategies for developing agricultural literacy.

Barbara Green teaches a variety of agriculture courses for students in grades 8–12. At the National Association of Agricultural Educators (NAAE) Convention she participated in a workshop advocating the need for all students to be agriculturally literate. Barbara has always thought her mission with the eighth graders was to get them interested in agriculture so they would enroll in her high school courses. Based on the workshop presentation, she is now asking herself if her eighth-grade agriculture class should have more of an agricultural literacy focus. She is also wondering what it means for her high school students to become agriculturally literate. Barbara is asking very important questions.

What exactly is agricultural literacy? What content and experiences do all students need to become agriculturally literature? Why do students need to be agriculturally literate?

Just where do we get our food? The answer is not easy and is far more involved than "at the local grocery store." In our modern society, an increasing number of people do not know what is involved in producing wholesome, nutritious food and making it readily available. This is one rationale for why we need to provide education for agricultural literacy.

With only about 1% of the nation's workforce currently involved in producing food and fiber, a large part of our society has limited exposure to agricultural production. Today, many people are unaware that agricultural producers are the primary source of the nation's food and fiber products. Agricultural educators can play a key role in educating about the importance of the plants, animals, and natural resources systems.

FIGURE 15.1 Children are enjoying an agricultural literacy presentation from a high school student and FFA member. (COURTESY OF NATIONAL FFA ORGANIZATION.)

THE MEANING AND IMPORTANCE OF AGRICULTURAL LITERACY

Agriculture is the science, business, and technology of plant and animal production. It includes the systems for producing food and fiber and managing the environment and natural resources used by society. Today, we

often refer to all of agriculture as the agricultural industry. This is because it includes agricultural supplies and services, marketing and processing, horticulture, forestry, wildlife, aquaculture, agricultural power, and other areas. The functions carried out that support production agriculture are called agribusiness. ***Agricultural awareness*** is the realization, perception, or knowledge of the agricultural industry, which is sometimes referred to as the food, fiber, and natural resources system.

Agricultural education is a systematic program of instruction available to students wanting to learn about the food, fiber, and natural resources system. Approximately 6% of the nation's school population is enrolled in agricultural education programs. This leaves about 94% of public-school students with no formal in-school instruction regarding the nation's food, fiber, and natural resources system.

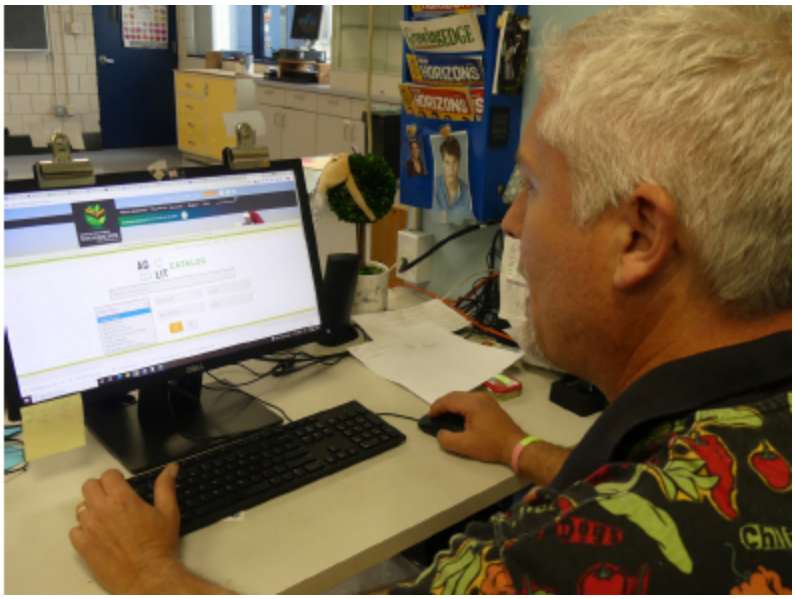

FIGURE 15.2 Using an agricultural literacy lesson plan library to prepare for teaching elementary school children.

Literacy

Literacy is a term used to describe the ability to read and write. It can also refer to having more than average knowledge. A person who is literate is someone who is educated. An educated individual should have at least a basic understanding of the food, fiber, and natural resources system and the role it plays in the world. However, many "well-educated" individuals in

the United States have no knowledge of the agricultural industry, which has an impact on their daily lives and is essential for their health and well-being.

In 1988, the National Research Council of the National Academy of Sciences released a study of agricultural education that made a distinction between education *in* agriculture and education *about* agriculture. This study defined "education in agriculture" as the vocational or career preparation component of agricultural education. It also surfaced the idea of ***agricultural literacy*** and defined it as "education about agriculture." In this chapter, agricultural literacy describes the attainment of knowledge and understanding of the food, fiber, and natural resources system. The purpose of agricultural literacy is for youth and adults to use their knowledge and understanding to make informed purchasing, land use, and political decisions.

Importance

The National Academy of Sciences study stated the topic of agriculture was so important it should be taught to more than the small percentage of students enrolled in agricultural education programs. It concluded all individuals should have a basic understanding of the nation's agricultural systems and everyone should have some knowledge of where and how food and fiber are produced, processed, and distributed. The study also indicated all individuals should be able to make informed choices about their own diet and health and possess the knowledge needed to understand the importance of caring for the environment.

FIGURE 15.3 All people need an understanding of the importance of agriculture in feeding the world. (COURTESY OF U.S. DEPARTMENT OF AGRICULTURE.)

The National Academy of Sciences study generated considerable interest among agricultural educators for agricultural literacy and served as a catalyst for numerous additional studies on this topic. In 1999 the National Council for Agricultural Education released *Reinventing Agricultural Education for the Year 2020*. The plan's stated vision was that all people will value and understand the important role agriculture plays in individual and world well-being. One goal of this strategic plan was for all students to attain agricultural literacy. Although the agricultural education profession does not currently have a new strategic plan, efforts such as SAE for All continue to emphasize the importance of an agriculturally literate population.

Few people realize approximately 20% of the U.S. workforce is involved in the agricultural systems and, worldwide, more people work in agriculture than in any other occupation. Broadly defined, the food, fiber, and natural

resources system includes the science and business of plant and animal production, along with management of wildlife, forests, rangelands, rivers, oceans, and renewable natural resources. The system also includes horticultural crops, such as lawns, trees, gardens, landscaping, and turf for sports fields and golf courses.

The agricultural system impacts many aspects of each individual's everyday life and should not be taken lightly. The world's population is continuing to increase, which means the demand for agricultural products used for food, shelter, and clothing will also increase. It is important for all citizens to have an awareness of the importance of agriculture in the world. This is a tremendous undertaking and requires the commitment and cooperation of many agencies, organizations, and groups, including agricultural education teachers and their students. Agricultural education teachers and students should be primary providers and facilitators of opportunities for increasing agricultural literacy. According to McDermott and Knobloch (2005), national leaders in agricultural education have identified literacy and awareness of agricultural education as major issues of importance to the future of agricultural education. The American Association for Agricultural Education (AAAE) National Research Agenda 2016–2020 has as its first research priority that the public and policy makers understand agriculture and natural resources (Roberts et al., 2016).

NATIONAL AGRICULTURAL LITERACY STANDARDS

Achieving agricultural literacy for all students requires classroom teachers to infuse agriculture into their curriculums. To ***infuse*** is to introduce one thing into another so as to affect it. In relation to agricultural literacy, it means to include agricultural lessons, examples, and topics in courses for other subjects. Leising et al. (1998) presented a framework for infusing agricultural literacy into core academic subjects across grade levels and described what young people should know about agriculture when they graduate from high school. A set of sample lesson units and a literacy test were included in the guide they developed.

Agricultural literacy efforts are organized by multiple organizations on the state and federal levels. The United States Department of Agriculture–

National Institute of Food and Agriculture, the National Agriculture in the Classroom Organization, and Utah State University collaborated to create a National Center for Agricultural Literacy. The center's website is a hub for resources, research reports, and learning opportunities. The website can be accessed at www.agliteracy.org.

In 2013, Spielmaker and Leising authored the publication *National Agricultural Literacy Outcomes*. These outcomes are organized by theme and have grade-level benchmarks for kindergarten through grade 12. Academic subjects recommended for integration of agricultural literacy outcomes include social studies, science, and health.

Role of Secondary Agricultural Educators

As recognized professionals, agricultural education teachers have a large role to play in creating an agriculturally literate society. The major deterrent to agricultural education teachers advancing agricultural literacy to students other than those enrolled in their programs is finding sufficient time to address this issue. Agriculture teachers generally view assisting other students as a good thing but outside the primary focus of the agricultural education program. However, many agricultural education teachers do realize there is value in spending time on agricultural literacy. For example, they understand educating younger students about agriculture and agricultural education is a prime recruitment opportunity for attracting more students into the local agricultural education program.

Agricultural education teachers can facilitate efforts within their school system to provide agricultural literacy through elementary and other secondary teachers. Agricultural education teachers can use the many resources and strategies available for infusing agriculture into the public school curriculum.

Role of Agencies, Organizations, and Businesses

A number of agencies, organizations, and businesses have developed materials for use in teaching about many topics related to agriculture. However, these groups are not directly connected to the schools and often face barriers getting their materials into the hands of teachers most likely to use them. Most teachers, on the other hand, do not understand where to find

good agricultural instructional materials and do not have the time to search for materials outside their subject areas. Agricultural education teachers can become links between teachers desiring to teach agriculture and groups desiring to have their materials utilized by classroom teachers.

FIGURE 15.4 Young MacDonald's Farm exhibits promote agricultural literacy. (COURTESY OF LEDYARD AGRI-SCIENCE & TECHNOLOGY PROGRAM.)

USDA and State Agriculture Offices

The U.S. Department of Agriculture (USDA) and the state agriculture offices are good sources of information. Websites, personnel, materials, and other resources related to agricultural literacy are available. For example, the USDA website includes information for children, youth, and other groups. The USDA web address is www.usda.gov/.

Agriculture in the Classroom

Agriculture in the Classroom (AITC) is among the best-known examples of an agricultural literacy initiative. AITC exists in every state and has had a federal presence within the U.S. Department of Agriculture. By merely introducing an AITC resource person to the faculty in an elementary school,

the agriculture teacher can help open an entire school to agricultural literacy instructional materials, human resources, and teacher training opportunities.

Many resources are available through AITC. A good place to begin is the Agriculture in the Classroom website: www.agclassroom.org. This site features a wide range of materials at the beginning, intermediate, and advanced levels. Teachers can identify key contacts in their states who have resources available and who serve as resource persons for instruction. The resources often focus on the early childhood years as well as the middle school grades.

The American Farm Bureau Federation and its state affiliates have actively pursued AITC. Materials about agriculture have been provided to elementary school teachers. Workshops, field trips, and other means have been used to train teachers in AITC. Resource persons are available through local farm bureaus and other organizations.

American Farm Bureau Foundation for Agriculture

The ***American Farm Bureau Foundation for Agriculture*** is a source for materials, programs, and links to promote agricultural literacy. Its website, www.agfoundation.org, has free resources including agricultural statistics, games, publications, and resource guides.

FIGURE 15.5 A community garden is a popular setting for agricultural literacy education.

Displays and Museums

Government agencies, organizations, and businesses often promote or establish exhibits. Most states have agricultural museums that help promote an understanding of agricultural history. Many states have working farms open to the public for tours and education. Land-grant colleges and universities have experiment stations that are excellent for field trips and other activities.

National FFA Organization

Many agricultural education teachers teach middle school/junior high courses. One of the more visible results of agricultural education's recent attempts to develop agricultural literacy programs has been the increasing number of middle school/junior high agricultural education programs. The National FFA Organization made changes to its constitution and bylaws that have promoted middle school participation. The change officially allowed agricultural education students in grades 7 and 8 to become FFA members (National FFA Organization, 2021).

The middle school/junior high curriculums are generally exploratory and designed to increase awareness and knowledge of agriculture, whereas high

school programs are more focused on career preparation. The middle school/junior high programs provide the most effective agricultural literacy education in the nation; however, they reach only a very small percentage of the total school population.

Teacher Education

Teacher training programs for agricultural education focus primarily on working with middle school and high school students. Thus, agriculture teachers sometimes fail to realize children in the lower grades are the ones most receptive to accepting and applying new concepts. This means agricultural awareness should be an important part of public education at the very beginning of a child's formal schooling.

Currently the agricultural literacy efforts for the lower grades are less structured than those for the middle school/junior high levels. Agriculture teachers desiring to make an impact on increasing all students' awareness of agriculture should devote time to assisting with agricultural literacy efforts for students in the lower grades.

Most elementary and high school teachers have no background in agriculture and are, therefore, not inclined to try an area that is of little interest to them. A teacher's background and experience are important in determining the topics they are willing to teach. Teachers need an awareness of agriculture before they can be successful teaching it.

Universities that prepare agriculture teachers can assist in agricultural literacy efforts by helping teacher candidates in other subject-matter areas increase their understanding of agriculture and how it can be infused into academic courses. State education agencies and teacher preparation programs can help prepare for and support the teaching content of junior high/middle school agricultural education programs and provide leadership for articulating these programs with those offered at the high school level.

Food for America

Agricultural education teachers in many schools provide agricultural awareness programs for elementary students through the FFA Food for America program. This program offers opportunities for leadership development to agricultural education students while increasing the agricultural awareness of elementary students and teachers. Joint activities

with the FFA Alumni and Supporters, Young Farmers, and parent booster clubs are very effective strategies in which the teacher is the facilitator and not the primary deliverer of instruction. These joint efforts may include tours of school farms, Young MacDonald's Farms, school assembly programs, and/or demonstrations presented to individual classes. The activities are often conducted during National FFA Week. The Food for America curriculum can be found on the National FFA website, www.ffa.org.

Activity Orientation

Many students are very interested in animals and plants. They will respond positively to instruction that is hands-on and actively involves them. With the tremendous pressures on teachers and students to increase performance on state and national assessments, instructional materials that help teachers achieve the objective of higher student academic performance would be welcomed. Providing agricultural lessons that help students gain academic knowledge and skills measured by standardized assessment exams is critical for enticing other teachers to utilize agricultural instructional materials. Agriculture teachers can demonstrate how agriculture can be used as a motivational tool to increase student interest and enthusiasm for learning. Powell, Agnew, and Trexler (2008) recommended multiple approaches to delivering agricultural literacy.

Shared Resources and Facilities

Agriculture teachers can team teach with other teachers to present agricultural information, and/or they can help other teachers find materials that focus on the subject of agriculture and on an increase in academic achievement in core subject-matter areas. The internet enables agriculture teachers and students to more readily find high-quality instructional resources for increasing agricultural literacy. Agriculture teachers can also provide educational programs directed at students in other courses and programs at various grade levels by using today's technology. This technology allows lessons to be delivered synchronously or asynchronously to multiple classrooms.

Another important strategy often overlooked is for the agriculture teacher to provide other teachers with access to facilities, resource people,

equipment, and the local agricultural community. Other teachers do not have the connections with the agricultural community that the agricultural education teacher possesses. By connecting other teachers to key agricultural resources, the agricultural education teacher can facilitate the teaching of agriculture by numerous other teachers.

REVIEWING SUMMARY

All people need to value and understand the importance of agricultural systems and what they contribute to world and individual well-being. Agricultural literacy is a major goal of agricultural education; however, widespread cooperation and commitment are required to achieve nationwide knowledge and understanding of agriculture. Of necessity, agricultural literacy involves many agencies, organizations, and groups interested in creating awareness and understanding of the agricultural systems in this country.

Agriculture teachers and their students play an important role in educating all students about the plants, animals, and natural resources systems. In some instances, they are the primary deliverers of instruction about agriculture, and in many other endeavors, they serve as facilitators of the process.

QUESTIONS FOR REVIEW AND DISCUSSION

1. What is agricultural literacy? Why is it important to society?
2. What are some strategies agricultural educators use to increase agricultural literacy?
3. What should be the role of the agricultural education teacher in providing agricultural literacy?
4. What is Agriculture in the Classroom?
5. What are the ways an agriculture teacher can collaborate with other teachers to support agricultural literacy?

ACTIVITIES

1. Develop an agricultural literacy lesson appropriate for infusion into a middle school course. Identify the course for which the lesson is designed, the estimated time required to teach the lesson, and the best time of year to teach it.
2. Use the internet to investigate agricultural literacy instructional materials. Develop a list of sources for the materials and identify the grade level(s) for which the materials are recommended. A site for starting your search is www.agclassroom.org.
3. Investigate the agricultural literacy structure, providers, and training opportunities within your state and prepare an infographic you could share with your future teaching colleagues.

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16

Middle School Agricultural Education

TERMS

Association for Middle Level Education
concrete operations
Erik Erikson
Food for America
Jean Piaget
preoperational
student-centered instruction

OBJECTIVES

This chapter addresses the National Quality Program Standards for Agriculture, Food, and Natural Resources Education (National Council for Agricultural Education, 2016), specifically Standard 6: Certified Agriculture Teachers and Professional Growth. It has the following objectives:

1. Explain the concept of middle schools in American education.
2. Discuss the role of middle school agricultural education.
3. Identify stages of student maturation and other developmental factors influencing methods of instruction in middle schools.
4. Describe instructional strategies in the middle school environment.
5. Describe the function of FFA and supervised experience.

Thomas Watson, a college senior in agricultural education, was having some doubts about whether or not he should begin his teaching career in a high school or a middle school. He called his former agriculture teacher, Bob Kendall, for advice. Bob, now retired, agreed to meet Thomas for lunch at a local café.

"So what questions do you have about your teaching career? You aren't getting cold feet, are you?" asked Mr. Kendall.

“No sir, I am looking forward to teaching. But where? Milltown Middle School has a position open, and the principal there contacted me about it. But I don’t know …” Thomas’s voice trailed off.

“But you aren’t sure if teaching middle school is for you?” Mr. Kendall interjected.

“That’s right,” said Thomas. “I always imagined teaching at the high school and never thought much about middle school. I don’t know if I can chase a bunch of little kids around the classroom all day.”

Mr. Kendall thought for a moment. “Have you been in a middle school lately?”

“Not since I was a student in one,” Thomas replied.

Mr. Kendall looked at his watch. “When you finish your coffee, let’s ride over to Brookfield Middle School. I know the principal and teacher there, and maybe they would show us around.”

Thomas agreed. “Anything that will help me make a decision is welcome.”

Mr. Kendall and Thomas climbed into Mr. Kendall’s car and drove to Brookfield Middle School. After meeting the principal, Mr. Kendall and Thomas walked through the hallways on the way to the agricultural education department. After meeting with Ms. Welborn, the middle school agricultural education instructor, Thomas and Mr. Kendall were treated to a facility tour by two students. They observed students in the greenhouse conducting germination experiments and noted several agricultural science projects in progress in the classroom.

On the drive back to the café Mr. Kendall asked Thomas what he thought of the school. Thomas could scarcely contain his enthusiasm for what he had just seen. “I thought I would see loud, rude children running in the hallways. I thought I would see hyperactive young people trying to figure out what life was all about. And the teachers … I thought they would be frantically chasing about trying to establish order and they would have few instructional resources. Was I surprised! The hallways were quiet. The students were pleasant and cooperative. When the class period was over, they changed classes in an orderly manner and without lagging. The teachers were businesslike and professional. They appeared to have an abundance of instructional resources. There was no downtime—everyone

was engaged in the teaching–learning process. This settles it for me. I am going to apply for the job at Milltown Middle School."

MIDDLE SCHOOLS IN AMERICAN EDUCATION

Junior High Schools

Junior high schools came into being in the early 1900s. These schools carved away the top two to three grades from the elementary school and often the lowest high school grade and placed them in a separate school. Junior high school curriculum followed a two-pronged approach—the college-bound program and the vocational program (Manning, 2000). School administration funneled students into one or the other through educational and aptitude assessments. This method met the needs of the established high school curriculum by preselecting students into the college or vocational categories.

The name "junior high school" implies that the purpose of these schools is to acclimate students to the high school model of education, with the sounds of ringing bells and slamming lockers echoing down the hallways as students rush from one classroom to another. Gruhn and Douglass saw junior high schools differently and expressed their views in the seminal work, *The Modern Junior High School* (Gruhn & Douglass, 1956). From their inception, junior high schools should have done the following:

- Integrated the school curriculum, blending math, science, language, and other subjects horizontally across grades and vertically across grade levels
- Provided for exploration in all aspects of the curriculum, including career exploration through career and technical education
- Introduced students to academic and career guidance
- Differentiated instruction
- Provided for the continued development of social skills

Many junior high schools were scaled-down versions of high school. Teachers, administrators, educational policy makers, and researchers concluded junior high schools failed to meet students' unique social and

academic needs. In the early years of these junior high schools, there was a concern that the instructional program did not meet the developmental needs of students. This model failed to serve the needs of adolescent learners because it was unable to account for cognitive, social, and emotional development. Students grapple with the transition from adolescence to the early stages of adulthood. The students in the middle school needed an educational program that was appropriate for their cognitive needs.

The Modern Middle School

A middle school is an administrative unit between the primary or elementary grades and the high school grades. The grades included are typically 6 through 8, though other variations exist. To meet the needs of young adolescents, the Association for Middle Level Education (Bishop & Harrison, 2020) determined there are essential elements the instructional program provides at the middle school level. These are described in Box 16.1.

FIGURE 16.1 Differentiated instruction is an essential ingredient in the middle school agricultural education program.

The modern middle school movement began to develop in the early 1960s. In the 1970s, junior high schools started to change their names to middle schools. Coupled with this name change was a new identity and role for these schools. This new structure for middle schools changed the curriculum, teacher training and development, and school leadership. Research on adolescent learners in the middle grades began to inform teaching practice and educational policy. The social and emotional well-being of students became a priority. The curriculum, in the 2000s, started to adopt elements that address issues of diversity and inclusion. Cooperative learning became a much-used strategy for teaching. Interdisciplinary teams of teachers have a positive effect on student learning.

BOX 16.1 ***Essential Elements of Middle School Education***

- Student-centered and teacher-centered instructional methods encourage and develop critical thinking
- A rigorous, age-appropriate curriculum that uses technology to bring the world into the mind of the learner
- Learning experiences that allow for intellectual exploration, including education in the arts and humanities
- Instruction is organized for maximum benefit to students
- Learning experiences foster the development of the whole person
- Academic and career guidance opportunities encourage personal wellness and stewardship of a sustainable environment and economy
- Appropriate assessment strategies that adequately measure student progress
- Learning experiences that foster lifelong learning along with a desire to contribute to the growth of the community
- Educational experiences that demonstrate citizenship and encourage students to be civic-minded learners

Source: Bishop & Harrison (2020).

Throughout the 1990s, research and best practices guided middle grades education. With the passage of the No Child Left Behind Act of 2001, the focus shifted toward testing and accountability measures (Elementary and Secondary Education Act, 2002). The overall sense of what middle grades education should “look like” was driven by accountability measures.

Successful Middle School Attributes

In *The Successful Middle School: This We Believe*, Bishop and Harrison (2020) described the essential attributes of successful middle schools as defined by the ***Association for Middle Level Education***—the primary professional organization for middle grades instructors and administrators. These are displayed in Box 16.2, along with a description of how agricultural education could provide these essential attributes in middle school.

LEARNING THEORIES ASSOCIATED WITH MIDDLE GRADES EDUCATION

Teachers through the years have wondered what goes on the minds of middle grades students. The physical, social, emotional, and cognitive changes their bodies and minds are going through during adolescence have a profound and visible effect. These changes unfairly depict middle grades children as "unguided missiles" bouncing around in the classroom, unable to contain themselves. But what goes on in the minds of middle graders? The answer may exist in the theoretical work of educational psychologists and educators. Theories attempt to explain natural and observed phenomena. In the context of middle schools, theories help define what teachers are observing and experiencing in their relationship with their students. These theories can guide the selection and use of teaching strategies and even educational policy.

Piaget's Cognitive Development Theory

Jean Piaget (1896–1980) was a Swiss developmental psychologist. Although Piaget's doctorate was in natural sciences, he had a strong interest in philosophy, sociology, and psychology. Upon receiving his doctorate at the University of Neuchatel in 1918, he pursued additional training in psychology. Through his work in school laboratories, Piaget began to develop his model of adolescent development. Piaget studied the language use and reasoning abilities of children and the intellectual development of infants.

Piaget proposed that children develop socially and intellectually in stages. Piaget defined the first stage of development as the sensorimotor intelligence stage. This stage begins at birth and continues through the second year of life. This stage involves learning basic psychomotor skills and the simple perception of things. The second stage is the preoperational stage. It begins at age 2 and progresses through age 7. In this stage, the child begins to understand the symbolic nature of things. A child's intuition begins to develop. While the child cannot perform complex mental operations, they develop logical thought (Flavell, 1963). For instance, the child can determine whether two objects are tall or short compared to each other. However, the child may not correctly select from containers of various shapes and sizes the one that likely holds the most liquid.

The ***preoperational*** stage occurs when children begin to talk. Until about age 4, children only think in terms of themselves. By the late preoperational stage, they will have developed to the point where they have a limited ability to see another person's point of view. The child's imagination begins to come alive, and they learn how to play alongside other children.

BOX 16.2 *What Successful Middle School Programs Are*

Responsive to the unique characteristics of the adolescent learner—The SAE program is designed to provide individualized learning experiences based upon a student's interests and preferred career path.

Challenging by creating an environment of high-performance expectations—The FFA awards program and the financial incentives and awards provided by the SAE program set a high bar for performance.

Empowering students to take charge of their learning—Students develop individualized learning plans through their SAE.

Equitable learning opportunities for all students—The FFA provides leadership and career development opportunities for all members.

Engaging students in the learning process involves them in decision-making and motivates them through personal ownership of the content—The FFA elects student officers who provide leadership for the FFA chapter.

Educators respect young learners—Agriculture teachers mentor students by coaching them in FFA Career Development Events and meet the student and their parents during SAE program visits at the student's home or place of work.

The school welcomes all students—The agriculture teacher uses teaching materials that are free from bias.

Every student has an adult advocate—The agriculture teacher advocates for students through mentorship of the students' SAE project and serving in the advisor role for the

FFA chapter.

Schools are safe without compromising student rights—Agriculture teachers manage labs and all learning activities with student safety as the primary consideration.

Counseling services meet the needs of young learners—The agriculture teacher provides mentoring and advice for all students through their SAE program.

Families are partners in learning—The agricultural education program involves parents and families in program advisory committees through the FFA Alumni and Supporters Organization and SAE programs.

The school utilizes community and business partners—Students are placed with community and business partners in the SAE program.

Educators are well prepared and skilled at teaching—Agriculture teachers must be certified to teach middle grades in agricultural education.

The curriculum is relevant to student needs and rigorous—The agricultural education curriculum is devised to increase student knowledge about modern best practices in the agricultural sciences.

The school and curriculum support the well-being of the whole child—The FFA program provides awards and recognition for student achievement at all grade levels.

Active learning opportunities abound and assessments measure learning —Standards and metrics devised by the FFA provide a measure of progress for students involved in FFA activities. The SAE program allows students to measure progress toward career goals through extensive record keeping and journaling.

Stakeholders have a shared vision of the school—Stakeholders participate in program advisory committees, advising school leaders on areas for growth and development.

Policies are student-centered and unbiased—The FFA has established a clear structure for student leadership in FFA programming, and the SAE program is focused solely on a student's career interests.

School leadership is skilled and applies research-based strategies for instruction—Agriculture teachers differentiate instruction through hands-on learning activities designed for students to progress at their own pace.

School leaders build a culture of collaboration —Students participate in team-building activities in the FFA and group learning activities in hands-on lab activities.

Teachers adopt a model of continuous improvement—Agriculture teachers participate in regional and state in-service training opportunities. The National Association of Agricultural Educators provides opportunities for collaboration across state boundaries.

The school is designed for the benefit of students—The agricultural education program follows the career and technical education model, which provides students with the knowledge and skill to pursue their preferred career choices.

Children enter the third stage, concrete operations, at around age 7. Children in this stage are able to logically organize their thoughts. Their thinking is very concrete, with definite ideas of right and wrong. They can develop ideas and reach conclusions based on inductive reasoning, or rather, can take specific information and apply it to a general principle. In this stage, a child begins to think about how other people might view a situation.

The formal operations stage begins around age 12, or when a young person enters middle school. This stage is the threshold of adulthood in terms of cognitive development, according to Piaget. Children can begin to consider moral, philosophical, and ethical issues. They begin to exercise their ability for abstract thought and reasoning. And, they begin to use deductive reasoning to solve a problem or answer a question. A young person can start to apply the scientific method to solve problems and answer questions. Piaget's theory provides insight into the development of adolescents, but other theories add to the body of knowledge.

Erikson's Stages of Social-Emotional Development

Erik Erikson, a developmental psychologist in the late 20th century, proposed a psychological theory of development. He described human socialization as an eight-stage process. Each stage results from a felt internal need that must be resolved to reach the intended outcome—an average, well-balanced, emotionally stable child. The first stage encompasses the period from birth to age 1 when children learn to trust others. If a nurturing environment embraces the child, they develop a fundamental optimism and trust of others. Jean Piaget identified this stage as a child's sensorimotor period, during which the child develops physical coordination of limbs and moves from reflexive action to synthesized action.

In the second stage, the 2 to 3 age bracket, the individual develops a need for autonomy. Many parents know this stage as the "terrible twos," characterized by a child's need to be assertive.

Erikson identified the third stage as the "play" stage. In this stage, the child learns to imagine and plays cooperatively with other children. It is in this stage that the child first begins to develop skills in leading and following. Piaget's preoperational period coincides with Erikson's third and fourth stages, in that the child develops reasoning skills and more complex speech patterns.

Erikson's fourth stage begins sometime around the age at which the child goes to school. In this stage, the child starts mastering peer relations, cognitive skills in reading and math, and the complex rules associated with formal play and organized recreation. The child is likely to enter middle

school during this stage and progress from it to the next phase before going to high school.

Erikson's fifth stage is just beginning upon the child's departure from middle school, when the child needs to develop a unique identity. Piaget identified this stage as the ***concrete operations*** period, in which the child develops organized and logical thinking skills. Before leaving middle school, the child will have entered Piaget's period of formal operations and begun to develop abstract thought and prepositional logic ("if-then" processes). Furthermore, the middle-grade years see the beginning of the physical maturation process and puberty.

The transition from middle school to high school is a challenge for most adolescents. The high school learning environment may seem impersonal and grade-oriented. The competition for academic scholarships begins in high school, along with physical competition in organized athletics. The high school years are the beginning of part-time jobs and serious talk about colleges and careers. In agricultural education, the curriculum narrows to specialized career pathways, and students are required to choose the classes that most nearly match their career goals. The high school environment is very different from the middle school environment, and preparing for the transition from one to the other begins in middle school.

FIGURE 16.2 Middle grades students practice academic skills in a safe and welcoming social environment.

The first five stages of Erikson's model provide the foundation for the three remaining phases of human development. Students who have successfully resolved conflicts in the first five stages are prepared for young adulthood, which is stage 6. In stage 6, young adults hone their sense of identity in preparation for developing love relationships with others. Young adults who find it difficult to trust and commit to others will experience difficulty developing intimate relationships and may feel socially isolated.

As individuals move into middle adulthood, they experience the seventh stage by building upon intimate relationships and become caregivers through parenting and mentoring. In Erikson's final and eighth stage of human growth and development, adults come to terms with their existence by reflecting positively on their lives. Adults in this stage of maturity understand they cannot change their past and accept responsibility for what their lives have become. In the last stages of life, the maturation process is complete.

Bandura's Social Learning Theory

Bandura proposed that learning occurs through observation and modeling. The learner gathers new knowledge by observing the behavior of others. The learner stores the information about the behavior for retrieval later. This information is tagged and coded in the learner's mind. In a future circumstance, the learner retrieves the data and applies it. An example of Bandura's model in action is in the safe use of power tools. The learner observes the experienced professional teacher using the radial arm saw in an agriculture shop. The student stores information in memory about the adjustment levers, start/stop switch, shields, and guards; and how the teacher places her hands on the saw controls. When the learner has the opportunity to use the saw for the first time, he will likely have stored enough knowledge to know where to place his hands to operate the saw. Perhaps a more elementary example would be using a hammer. The learner would only need to see someone using a hammer to drive a nail to know the hammer's essential function. Bandura further proposed that learning depends upon the learner's mental state. The learner's preferences, personal interests, and preferred methods of motivation can determine whether or not the behavior is learned. Finally, Bandura proposed that observing behavior in the right frame of mind may not be enough to cause a behavior change.

FIGURE 16.3 Teaching strategies that encourage positive social interaction are essential in the middle school agricultural education classroom.

The Rapid Development of the Adolescent Mind

In Piaget's model of cognitive development and the theories of Bandura and Erikson, the adolescent brain has gone through tremendous changes in the first 12 years of life. Remarkably, a child can learn to speak at around age 2 and discuss basic tenets of philosophical thought within 10 years. By the time a child reaches middle school, their brain has begun to develop at "warp speed."

Transitioning From Elementary School to Middle School

Belonging is a significant concern to middle school students. They have to feel they belong in the school community. The most effective teachers empathize with middle school students and help students respond to the pressures of homework, middle school culture, and social relationships. Middle school students are developing but have not fully developed planning, decision-making, and ethical reasoning skills. They are learning how to control impulsive behavior. It may prove helpful for the agriculture

teacher to employ techniques that help middle school students survive the transition from elementary school. Box 16.3 provides tips for helping students transition to middle school.

BOX 16.3 ***Helping Students Transition to the Middle Grades***

- Arrange a school visit day for elementary school students to the agricultural program at the middle school. Have tours of the labs and greenhouse facilities, and teach a mini-unit of instruction on an agricultural subject.
- Meet with elementary school teachers of rising middle grades students to gather information on new students in your program. Information about particular student strengths and their personal or career interests is helpful.
- Send a letter of congratulations to rising middle grades students on their graduation from elementary school.
- Continue to make connections with parents. Invite them to open house programs and provide regular feedback on student progress.
- Remember, the teacher sets the tone and morale in the classroom. A healthy dose of humor keeps the stress levels down and encourages students to develop an excellent professional working relationship with the teacher.

MIDDLE SCHOOL AGRICULTURAL EDUCATION

There are approximately 13,300 middle schools in the United States, a 537% increase from 2,100 schools in 1971. The number of schools designated as junior high schools decreased to 2,500 by 2017 (National Center for Educational Statistics, 2021). The number of students enrolled in agricultural education coursework is not well known. The National Center for Educational Statistics, which collects data on curriculum and instruction, defines middle schools as a subset of elementary schools. This makes it difficult to find or select data about agricultural education in middle schools. While there is no central statistical database to draw from, an examination of state education departments finds curriculum for middle grades in agricultural education.

One significant advantage of the middle school agricultural education program is that it exposes students to various learning experiences related to the agricultural sciences. The learning experiences are coupled with

opportunities for career exploration, thus enabling students to begin formulating career goals based upon their occupational interests. The middle school mission of literacy and exploration in the food, fiber, and natural resources systems aligns with the strategic plan for agricultural education (National Council for Agricultural Education, 2021).

Middle school agricultural education programs assist students in developing necessary social skills and decision-making skills while providing basic knowledge about agriculture and natural resources. This allows for the practical application of academic disciplines. Furthermore, middle school programs also allow for the developmental needs of youth. To help students develop a sense of belonging and self-worth, the agriculture teacher arranges career interest surveys to help students identify their strengths. Learning activities that develop citizenship and teamwork skills provide outlets for the growth of social skills. Lessons that focus on international agriculture build a sense of community in the classroom among students of differing cultures. To promote problem-solving and critical thinking, the teacher provides instructional activities that require these skills to solve authentic problems.

FIGURE 16.4 Middle grades students need opportunities to practice critical thinking and problem-solving. Agricultural education programs provide plenty of options.

The Middle School Agricultural Education Curriculum

The agricultural education program in middle school focuses on two significant areas: agricultural literacy and career exploration. The program aims to provide the fuel that ignites the spark of interest in a student for agricultural occupations. Because many agricultural disciplines are available to high school and college graduates, it is essential students receive a concentrated and directed study of agricultural careers at some point before graduating from high school.

Career exploration is the use of career-related investigative activities conducted in and outside the classroom. The goal is to help students identify future potential career interests and gain information to help plan their higher levels of education. Career exploration may involve reading about careers, watching videos, participating in job shadowing, volunteering, and gaining information in other ways. Overall, the best career exploration

involves “hands-on” experiences that provide vivid real-world opportunities.

Through ***student-centered*** instructional methods, the middle school agricultural education program offers students the opportunity to learn about agricultural careers and some of the skills needed in those careers. Following are some basic things a student might learn about a given agricultural job:

- Vocabulary and terminology specific to an agricultural occupation
- The impact of agriculture on the local, state, national, and global economy
- Basic skills in agricultural sciences, biotechnology, and engineering
- Leadership and human relations skills
- The overall importance of agriculture to humanity

(National FFA Organization, 2009)

Since middle school is an excellent place for students to begin developing personal and social skills for life after high school, the middle school agricultural education program should incorporate experiences that expose students to the world they will soon enter as adults. Through exploratory activities, students can learn firsthand about the technological and intellectual demands placed on workers in the industry.

Agricultural education has always gone beyond learning about “cows and plows.” With the exponential increase in technology in the agricultural sciences, there is a greater need for highly skilled workers. Career preparation has a place in the middle school agricultural education program.

Because adolescents are changing socially, emotionally, and physiologically in the middle school period, the agriculture teacher must design the curriculum and instruction to recognize the specific needs of these students. Adolescent students may have difficulty engaging in the lesson from time to time. Disengaged students need more exposure to differentiated instruction, as delivered by a competent and caring teacher. In middle school agricultural education, the teacher can engage reluctant learners by

- Focusing student attention on the lesson and eliminating or curtailing distractions
- Frequently explaining the importance of the lesson
- Using the personal experiences of students as part of the instructional process
- Providing several methods or opportunities for students to learn the lesson content
- Conducting diagnostic tests to determine how students are constructing meaning from the lesson content
- Paying careful attention to students' cultural backgrounds and providing an atmosphere of acceptance in the learning environment

(Turner, 2011)

Interdisciplinary Methods of Instruction

A unique advantage of middle school education is the opportunity for interdisciplinary methods of instruction. Agricultural education teachers should grasp the chance to work with other teachers in developing meaningful learning experiences for students. For instance, an agriculture teacher could partner with a science teacher to study aquatic life in a pond near the school. The students would meet the science teacher's goals through an exciting lab activity. In contrast, the students would complete the agriculture teacher's goals through a realistic exercise that demonstrates the tasks associated with an agricultural career area, such as wildlife biology.

An essential phase of planning a middle school agricultural education curriculum is to articulate it with the curriculum at the high school level. Articulation is achieved when educational activities are organized to facilitate students' continuous and efficient progress from one grade or class to another. Courses of study are sequenced so prerequisites are developed in the lower grades. For example, students in grade 7 learn skills that prepare them for grade 8, those in grade 8 learn skills that prepare them for grade 9, and so on.

The agricultural education curriculum may also be articulated within the same grade level among the various courses a student takes. For example, the science and language arts curriculums may be articulated and demonstrate continuity from one class to another.

A prime example of how articulation plays out in school is through school gardens and outdoor learning labs. For instance, research studies have demonstrated middle school outdoor learning labs in plant sciences can

- Increase a student's knowledge and interest in plant science
- Provide awareness about the environment
- Provide knowledge about food production and food systems
- Encourage teamwork and social skill development

There are more than 10,000 school gardens and outdoor learning labs on middle grades school campuses in the United States. Students who are actively engaged in gardening on the school campus are more likely to be involved in science education and participate more effectively in other school disciplines. The excitement of learning in the garden often transfers into learning in the science classroom (Skinner et al., 2012).

FFA in the Middle Grades

Career Development Events

The National FFA Organization offers a variety of Career Development Events for middle school students. Some of these, such as the floriculture event, may have junior divisions for middle school students at the state level. Still others, such as the conduct of meetings CDE, are designed specifically for middle school FFA members. The FFA offers leadership programming at the local, state, and national levels. These conferences build leadership and communication skills for members of all grade levels.

Leadership Programs

FFA offers several leadership programs at the state and national levels for middle-grade students. Participants explore shared leadership and career interests with others, and the conference provides introductory training in service-learning and community development.

FIGURE 16.5 Middle grades agricultural education programs support other academic disciplines through contextual learning experiences for students.

FFA Membership and Member Degrees

FFA membership is open to students in an agriculture class at the middle school level. The Discovery FFA Degree is the first degree a student can obtain as a member of FFA. This degree encourages middle-grade students to learn more about FFA and the agricultural industry. The requirements are consistent with the career exploration elements of middle grades agricultural education. This degree is open to agriculture students in grades 7 and 8. Additional requirements for this recognition include basic knowledge of the purpose of the FFA and involvement in FFA activities.

SAE in the Middle Grades

Middle school is a great place to start an SAE project. Middle-grade students can create exploratory experiences based upon their own learning experiences in the agricultural education classroom. Exploratory supervised experience can lead to a more sophisticated understanding of the agricultural industry (Moore & Flowers, 2012). Suppose the middle-grade

student stops taking agricultural education courses in the eighth grade. In that case, they should have learned enough about the agricultural industry to have a significant measure of appreciation for it. If the student chooses to continue to take agriculture courses in high school, the exploratory experiences they began in middle school can blend into foundational and immersion supervised agricultural experiences. (See Chapter 22 for more information on SAE.)

If the student was active in the FFA Agriscience Fair program, they might continue exploratory work by developing an experimental or analytical supervised experience. The middle-grade student need not wait until enrollment in a high school agricultural education program to begin work on an entrepreneurial, placement, or research-based SAE.

For some students, their first significant experience with agriculture happens during a ***Food for America*** program at their school (see Chapter 15). Students interested in the agricultural sciences can investigate them more thoroughly when they enter middle school and enroll in an occupational exploration course. The middle school agricultural education course can provide appropriate learning experiences that encourage students to seek more knowledge about agriculture and perhaps become valuable and productive in the agricultural industry.

REVIEWING SUMMARY

A middle school is a school between the primary or elementary grades and the high school grades. With grades 6 through 8 typically included, the students are at a time of significant personal development. Middle school agricultural education is an important component of the curriculum as it provides skill development and career exploration. Agricultural education in middle school meets two significant goals: agricultural literacy and career exploration. Agricultural literacy focuses on developing a proper understanding of food, fiber, and natural resources. Career exploration is the investigation of various career areas using a wide range of approaches.

Piaget’s cognitive development model and Bandura’s model are foundational works in understanding adolescent development. Adolescent

development is a stage-based process. Erik Erikson is well known for his eight-stage human socialization process as related to middle school students.

Instructional strategies may be student-centered and interdisciplinary. Student-centered instruction matches the maturation levels of the learners. Teachers determine and use a range of approaches in teaching.

FFA has an essential role in middle schools. Career Development Events, leadership programs, and related activities promote student development at the middle school level. Supervised experience beginning in middle school can lead to a more sophisticated understanding of the agricultural industry.

QUESTIONS FOR REVIEW AND DISCUSSION

1. What types of supervised experiences can a student have in a middle school agricultural education program?
2. What is a middle school?
3. What is the name of the association that serves middle schools? What is the central thrust of this organization?
4. What is career exploration? What is the goal of career exploration?
5. What are the eight stages in the human socialization process developed by Erik Erikson?

ACTIVITIES

1. Visit a middle school agricultural education program. Ask the agriscience teachers the following questions. Then, write a summary of your interview and use it as a basis for a classroom discussion.
   a. Why did you choose to become a middle school teacher? Why did you choose agricultural education as your field of expertise?
   b. What do you enjoy most about teaching in middle school?
   c. What do you enjoy least about teaching in middle school?
   d. How have middle schools changed since you first entered the teaching profession? How has agricultural education changed as well?

e. How do you handle the demands of teaching?
f. How is your program funded?
g. What effect does FFA have on your program? Does it help or hinder your instruction?
h. Generally speaking, what teaching methods work best for your students?
i. How do you manage your time as a teacher? (Alternate question: How do you accomplish all that you must do to be an effective teacher? What are some methods you use to utilize your time better?)
j. What types of assistance do you get from school administrators and parents?

2. Investigate the Association for Middle Level Education (AMLE). Begin with the association's website: www.amle.org. Determine the mission and goals of AMLE, how it supports the professional development of middle school teachers, and its advocacy role with policymakers. Prepare a report on your findings.

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