

Enhancing Learning with Audio

Knowledge Outcomes

This chapter addresses ISTE NETS-T 2.

1. Explain the differences between hearing and listening.
2. Identify four areas of breakdown in audio communication and specify the causes of such breakdowns.
3. Describe four techniques for improving listening skills.
4. Describe the most common types of digital and analog audio formats used for instruction. Include advantages and limitations of each type.
5. Illustrate one possible use of audio media in your teaching field. Include the subject area, audience, objective(s), role of the student, and evaluation techniques to be used.



Goal

Utilize the variety of audio materials available in the classroom. Describe the hearing-listening process and develop student listening skills.



ASSURE Classroom Case Study



This chapter's ASSURE Classroom Case Study video describes the instructional planning used by Mr. Aina Akamu for a high school advanced speech and communications class in Hawaii. He wants to create an end-of-course student project that meets the following goals: enhance student confidence in making oral presentations that reveal personal convictions, increase student abilities to conduct research, engage students in collaborative learning, and use audio technology to help students express their creativity and ideas. Mr. Akamu selects "What it means to be Hawaiian" as the topic of this project.

To view the **ASSURE Classroom Case Study** Video for this chapter, go to the MyEducationKit for your text and click on the ASSURE Video under Chapter 9 to explore how Mr. Akamu incorporates strategies to teach communication skills and uses technology, media, and materials to achieve 21st century learning environments.

Throughout the chapter you will find reflection questions to relate the chapter content to the ASSURE Classroom Case Study. At the end of the chapter you will be challenged to develop your own ASSURE lesson that incorporates use of these strategies, technology, media, and materials, for a topic and grade level of your choice.



INTRODUCTION

If you were asked which learning activities consume the major portion of a student's classroom time, would you say reading, answering questions, reciting what one has learned, or taking tests? Actually, typical elementary and secondary students spend about 50 percent of their school time just listening. The importance of audio experiences in the classroom should not be underestimated. This chapter discusses various means—referred to as *audio media*—for recording and transmitting the human voice and other sounds for instructional purposes.

In this chapter we will explore audio media and how they can be used effectively in PK–12 classrooms. We will also examine the hearing–listening process and the development of listening skills. Even though delivery and recording devices have changed, the basics of using audio for teaching and learning have remained the same. From an instructional point of view, it is important to include audio regardless of its source—CD, MP3 player, a computer, the Web, or an audiocassette.

AUDIO LITERACY

Audio literacy is actually the merging of hearing and listening. Putting together messages that prove to be meaningful to students when they hear them is important to learning. Learning to listen is a task that requires students to practice and develop good skills so that listening becomes an effective means for learning.

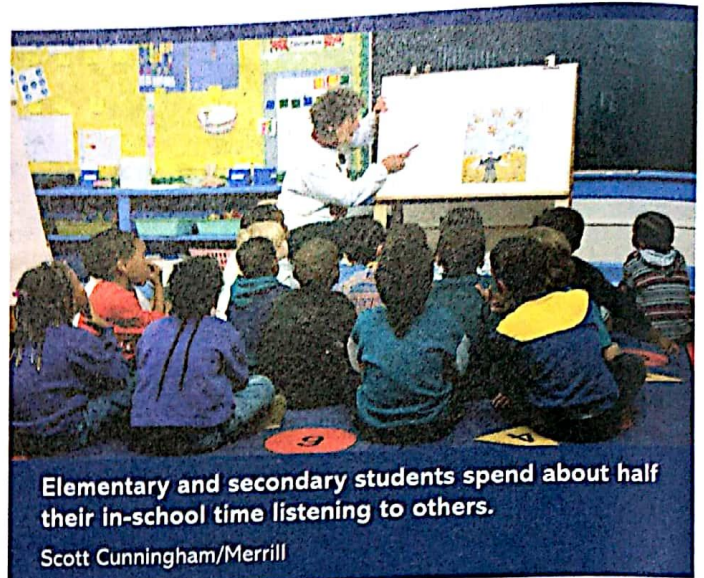
HEARING AND LISTENING

Hearing and listening are *not* the same thing, although they are of course interrelated. At the risk of oversimplification, we might say that hearing is a physiological process, whereas listening is a psychological process.

Physiologically, **hearing** is a process in which sound waves entering the outer ear are transmitted to the eardrum, converted into mechanical vibrations in the middle ear, and changed in the inner ear into electrical impulses that travel to the brain.

The psychological process of **listening** begins with awareness of and attention to sounds or speech patterns (receiving), proceeds through identification and recognition of specific auditory signals (decoding), and ends in comprehension (understanding).

Hearing and listening are both communication and learning processes. As with visual communication and



learning, a message is effectively composed by a sender and deciphered by a receiver to develop meaning. The quality of the prepared message is affected by the ability of the sender to articulate the message clearly and logically and in a way that addresses diverse audiences. Appropriate preparation of the message depends on the sender's skill in organizing and presenting it. For example, a teacher needs to know the vocabulary level of her students to be certain that they will be able to understand a recorded poetry reading. The efficiency of communication is also affected as the message passes from sender to receiver by the quality and efficiency of the audio medium. The understandability of the message then depends on the ability of the receiver to comprehend the message. Breakdowns in audio communications can occur at any point in the process: preparing (encoding), hearing, listening, or understanding (decoding), as illustrated in Figure 9.1. The hearing and listening process is recognized as a 21st century skill to ensure that communication informs, instructs, and motivates learners.

ASSURE Case Study Reflection



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Review the ASSURE Classroom Case Study and video at the beginning of the chapter. As Mr. Akamu works with his students, how might he guide them to think about both the encoding and decoding of their messages?

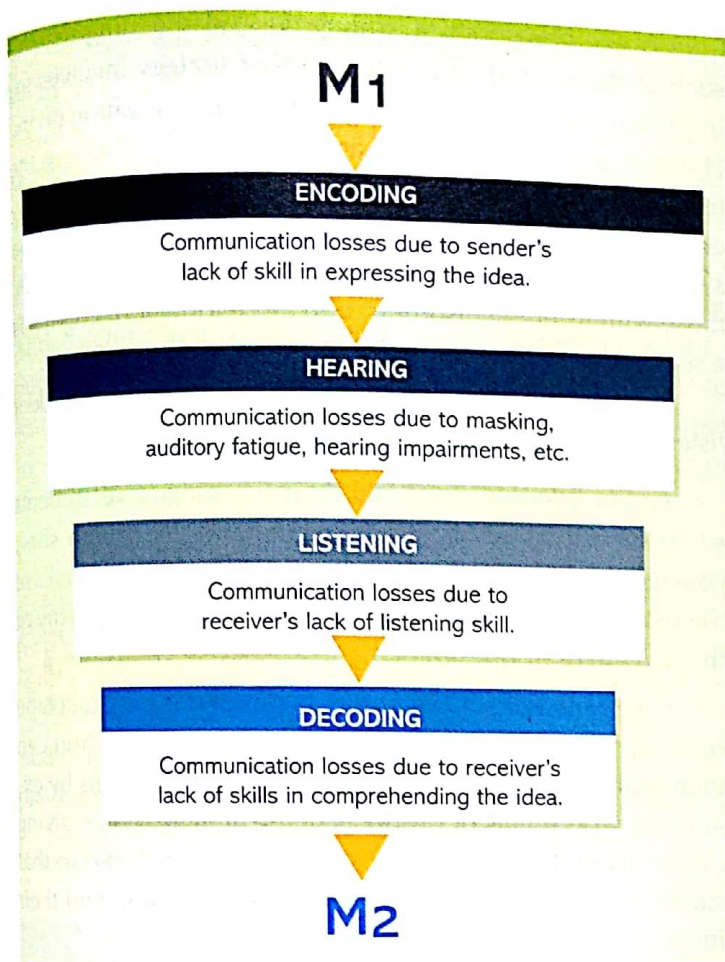


Figure 9.1

The Audio Communication Process

In the hearing–listening process, impediments at each step act like filters, reducing the perceived meaning to a small fraction of the intended meaning. M_1 = meaning intended by the sender. M_2 = meaning as received and comprehended by the receiver.

There are a number of factors that determine whether students are able to learn from audio resources. First, the volume of the sound might be too low or too high. If too low, students may have trouble picking up the meaning with any accuracy. If too high, students may actually stop listening to the offending sounds.

Second, a sound that is sustained monotonously, such as the droning voice of a teacher, may trigger **auditory fatigue**. You have probably had the experience of hearing an annoying sound—for example, a noisy muffler on the car you are riding in. But after a while you hardly notice the sound at all. You might stop thinking about it entirely until it stops, and then you notice the cessation. This is an example of auditory fatigue, the process of gradually “tuning out” or losing consciousness of a sound source—a process that is losing physiological as well as psychological. That is, the neural mechanisms transmitting the sound to the brain literally become fatigued from “carrying the same load” over and over.

In addition, your conscious awareness of the noise is diminished because it is “old news” and no longer of interest. The brain has a remarkable capacity for filtering out sounds it doesn’t want or need to attend to.

Third, an individual’s ability to hear may be physically impaired. When students have a cold, it is possible that their ability to hear in a noisy classroom is reduced. Even a small difference in hearing acuity can cause students to have difficulty discriminating between words and phrases—thus the potential for confusion. And with the trend toward including students with significant loss of hearing acuity in regular hearing classrooms, teachers need to make special considerations for providing visual cues that ensure these students clearly understand the information.

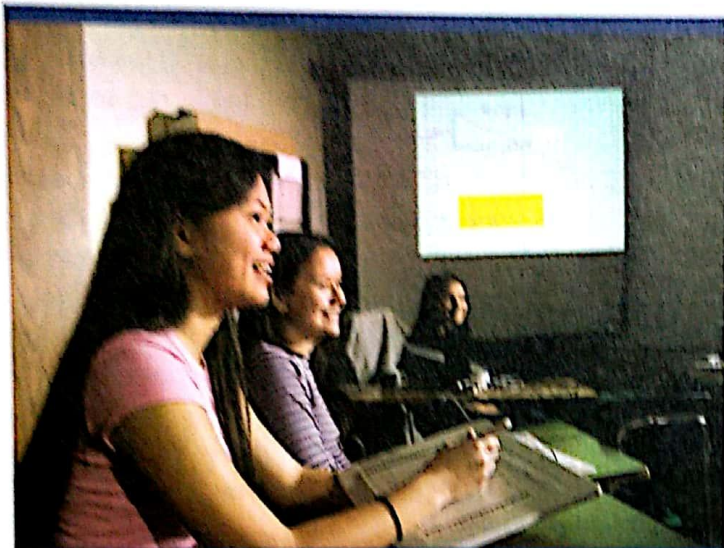
For example, if you want a message to be heard by all the students, then use a tone and volume that ensures all students in the class can hear your message. This does not mean that you need to shout. If you want to speak to an individual student in the classroom, then it is more appropriate to move close and speak with softer volume so as to not disturb other members of the class. In addition, when you are speaking to an individual, it is important to shift your word choices to be sure the vocabulary is meaningful to that student.

If you are assigning students to prepare a presentation for the whole class, then you may wish to provide them with opportunities to practice. By practicing, students will be better able to use the appropriate intonation and volume to be certain that their classmates can clearly hear and understand the presentation. Or, you may wish to use a microphone and speaker to be sure everyone in the class can hear well.



Working with individuals or small groups of students in the classroom you need to monitor your volume and vocabulary levels to meet their learning needs.

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Students enjoy presenting to their classmates to share what they have learned.

Michael Newman/PhotoEdit

The message can also be affected by the learners' listening skills or lack of them. Students must be able to direct and sustain concentration on a message. They must have the skill to think ahead while receiving the message (we think faster than we hear, just as we think faster than we read or write) and use this time differential to organize and internalize the information so they can comprehend it.

Finally, communication can break down because the learner lacks the experiential background to internalize and thus comprehend the message. As their teacher, it is important to use vocabulary that is familiar and language patterns that your students understand.

DEVELOPING LISTENING SKILLS

Until recently, much attention in formal education was given to reading and writing, a little was given to speaking, and essentially none was given to listening. Now, however, educators recognize listening as a skill that, like all skills, one can improve with practice.

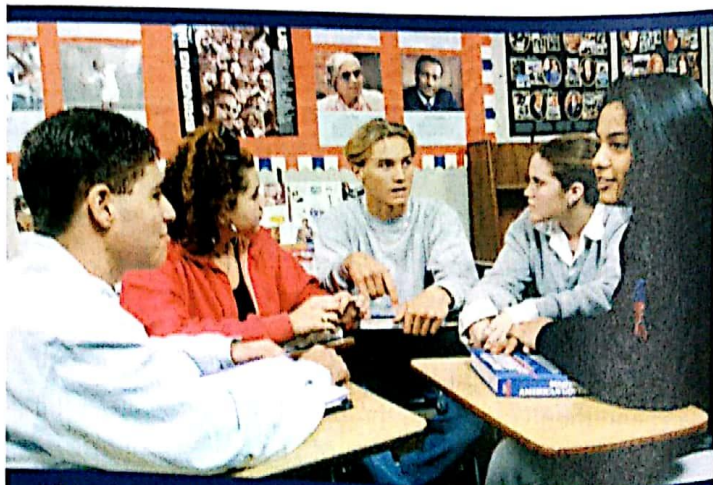
Hearing is the foundation of listening. Therefore, you should first determine whether all of your students hear normally. Most school systems regularly employ speech and hearing specialists to administer audiometric hearing tests that provide the data you need. Standardized tests also measure students' listening abilities. These tests are often administered by the school district, so check on the availability of listening test scores.

The classroom may not be ideal for the academic achievement of students with hearing impairments, for whom classroom noise and reverberation can cause problems. Potential solutions include relocating the student to the

front of the classroom or adding noise dampening devices such as drapes and carpeting. Another strategy involves using a sound field amplification system (see Innovation on the Horizon at the end of the chapter). With such a system the teacher wears a wireless microphone that transmits to several small speakers located throughout the classroom. These systems have been shown to help children who have colds, those with listening disorders, and those for whom English is a second language (Crandell, Smaldino, & Flexer, 2005).

You can use a number of techniques to improve student listening abilities:

- *Guide listening.* To guide their listening, give students some objectives or questions beforehand. Start with short passages and one or two objectives. Then gradually increase the length of the passage and the number and complexity of the objectives or questions.
- *Give directions.* Give students directions on audiotape or as a podcast that you have prepared in advance. You can then evaluate their ability to follow these instructions by examining worksheets or products of the activity. When giving directions orally, observe the "say it only once" rule so that students place value on both your and their time and their incentive to listen is reinforced.
- *Ask students to listen for main ideas, details, or inferences.* Keeping the age level of your students in mind, you can present an oral passage. You can read a story and ask primary students to draw a picture about what happened. Ask students to listen for the main idea and then write it down. Use this technique as well when you want students to draw details and inferences from the passage.
- *Use context in listening.* Younger students can learn to distinguish meanings in an auditory context by listening to



Listening skills are an important component of 21st century communication skills.

Will Hart/PhotoEdit

sentences with words missing and then supplying the appropriate words.

- *Analyze the structure of a presentation.* Ask students to outline an oral presentation. You can then determine how well they are able to discern the main ideas and to identify the subtopics.

- *Distinguish between relevant and irrelevant information.* After listening to an oral presentation of information, ask students to identify the main idea and then rate (from most to least relevant) all other presented ideas. A simpler technique for elementary students is to have them identify irrelevant words in sentences or irrelevant sentences in paragraphs.

AUDIO IN THE CLASSROOM

Audio adds a dimension to classroom environments that expands and deepens students' learning experiences. Imagine

your students listening to Abraham Lincoln presenting his inaugural address, Einstein explaining relativity, Ernest Hemingway reading a passage from one of his novels, or Picasso interpreting one of his paintings. Also imagine a third-grade student being recorded as she reads a story for her digital portfolio and then comparing that recording with stories she recorded in first and second grade.

HOW TEACHERS CAN USE AUDIO

Teachers can prepare recordings for use in direct instruction; for example, a second-grade teacher can record directions for students to create sentences with word cards. Teacher-produced recordings can also provide skills practice, such as pronunciation of a foreign language. The possibilities are limitless—as seen in the examples below and throughout this chapter.

A teacher of ninth-grade students with learning difficulties, but average intelligence, provides instruction on how to listen to lectures, speeches, and other oral presentations. The

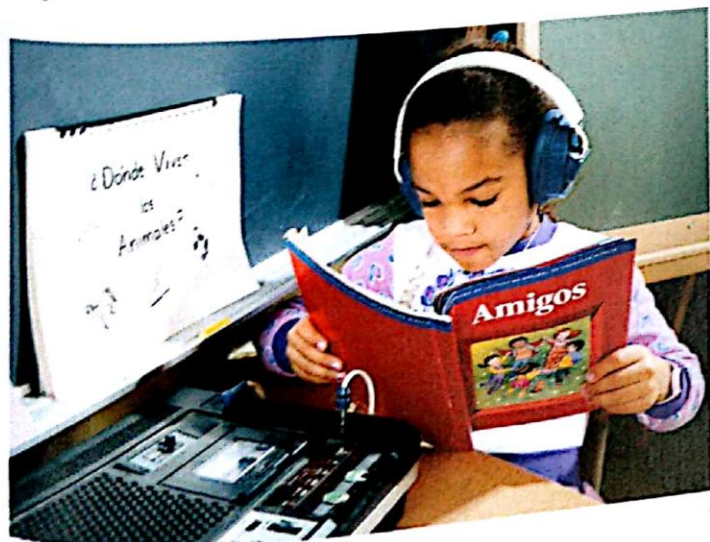


TECHNOLOGY for Diverse Learners

Audio

We have students in our classrooms with a variety of learning needs. The following examples demonstrate ways you can arrange to use audio resources to support learning.

The most familiar technique to assist learners with hearing impairments is closed-captioning for television and video programs. Multimedia presentations and audio materials on



Anne Vega/Merrill

the Web use this feature as well. You will also find most media available today offers captioning as an option that needs to be selected. This technology is also useful for students who are learning a second language, those listening to content in a noisy environment, and readers who need additional practice.

Some students enjoy listening to stories and will often benefit from “reading along” with the audio portion of a book. Students who select books beyond their regular reading levels also benefit from audio presentation of the story. The audio book option allows students to practice vocabulary and enhance their reading experiences as part of independent reading. When working with English learners, the addition of audio cues can help them understand the text they are reading.

Students who wish to challenge their learning experiences can delve deeper into history by using audio to explore famous speeches or to enhance their experience of a particular time period. For example, students who wish to explore the speeches of Martin Luther King to develop a presentation for their classmates on his themes and timeline might listen to his speeches and incorporate audio clips into a PowerPoint presentation for the class.



students practice their listening skills with CDs of recorded stories, poetry, and instructions. The teacher also uses commercially available CDs or free podcasts of speeches and narration. After the students have practiced their listening skills under teacher direction, they are evaluated using a recording they have not heard before.

A middle school teacher plays a CD for the 20 minutes she needs to set up her classroom for the school day. After a few seconds of music, the song fades as the narrator says, "What's new in classroom management techniques? Today we are going to explore together three techniques that will enhance your classroom skills . . ." The CD turns the classroom work setting into a learning environment, thereby making efficient use of the teacher's time for professional development.

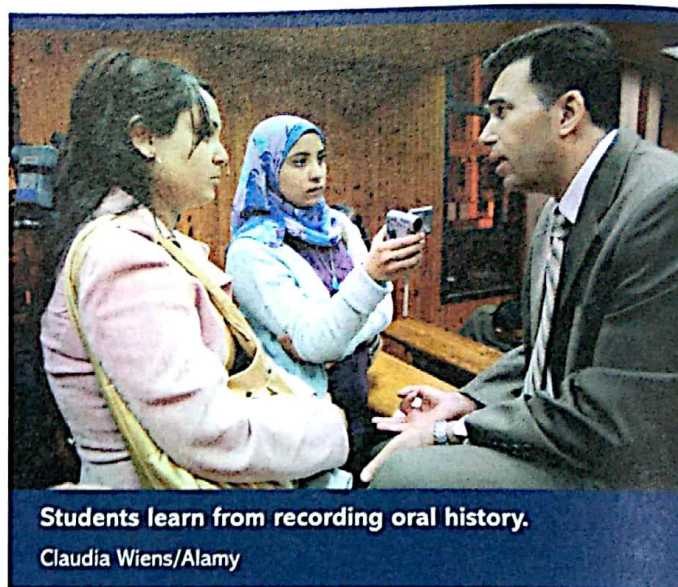
An often-overlooked use of audio materials is for evaluating student attainment of lesson objectives. For example, you may prerecord test questions for class members to use individually. You may ask students to identify sounds in a recording (e.g., to name the solo instrument being played in a particular musical movement) or to identify the composer of a particular piece of music. Students in social studies classes could listen to excerpted passages from famous speeches and asked to identify the historical person who most likely made them or to identify the time period of the passages based on their content. Testing and evaluating using audio is especially appropriate when teaching and learning have also taken place in that particular mode.

HOW STUDENTS CAN USE AUDIO

A popular project in social studies classes is the recording of **oral histories**, in which students interview local citizens regarding the history of their community. All the recordings prepared during the interviews are kept in the school media center. This project serves the dual purpose of informing students and residents about local history as well as collecting and preserving information that might otherwise be lost.

Audio recordings can be used for presenting book reports, which students may record during study time in the media center or at home. The best ones are posted on the library's website and can be accessed on computers in the media center, in the classroom, or at home. These recorded reviews can be used to encourage other students to consider their options before selecting books to read.

Students can also record information gleaned from a field trip on portable devices. On returning to the classroom, students can play back the recording for discussion and review. Many museums, observatories, and other public exhibit areas now supply visitors with prerecorded messages about various items on display, which may, with



Students learn from recording oral history.

Claudia Wiens/Alamy

permission, be downloaded or rerecorded for playback in the classroom.

Students can also record themselves reciting a poem, presenting a speech, performing music, and so on. They can then listen to the recording privately or have the performance critiqued by the teacher or other students. Many small-group projects can include recorded reports for presentation to the rest of the class. These recordings can become part of each student's electronic portfolio.

A primary student at a learning center listens to a CD or audiocassette of her favorite storybook. She follows along in the book to associate letter combinations with sounds. The technique encourages reading and promotes literacy.

The elementary class performs daily physical exercises to the music and narration of a CD. The teacher hopes the experience will promote lifelong good health through daily exercise and proper diet, which he also teaches.

Students love to hear and tell stories, which can be both entertaining and informative. Storytelling is an important skill to develop in students of all ages. The goal should be teaching students to express ideas through verbal communication. Students can use Audacity open source software to prepare the recordings with special sound effects or elements of music to enhance their presentation. Students also could use an audio interview with a special "guest" as a part of their presentation.

Individual students use a keyboard connected to a computer to "compose" their own music. They can "see" the music on the screen and hear what they have composed through headphones to keep them from disturbing other students in the room. They then write stories around the music or sounds they have created.

TAKING A LOOK AT TECHNOLOGY INTEGRATION

Poet Laureate

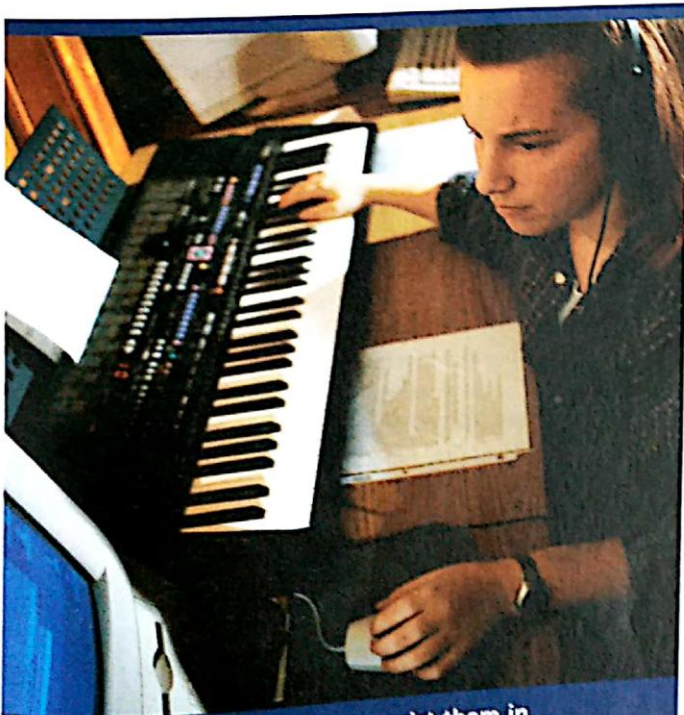
One day a tenth-grade English teacher was listening to NPR on his way to school. That morning the show "All Things Considered" had an interview with the poet laureate of the United States, who was explaining his "favorite poem project." Essentially he traveled all over the United States randomly asking people from school teachers to welders to read and discuss their

favorite poems while he recorded their responses on audiotape. He created an extensive library of people and poems. This teacher got the idea to adapt this project for his classes. The students loved it! The teacher was surprised not only by the emotional oral interpretations they submitted, but also by the depth of analysis portrayed in their short discussions of the poems, an activity in which even low-achieving students had success.

Source: Submitted by Matt Rose, Purdue University

AUDIO FORMATS

Audio comes in two primary formats: digital and analog. We will examine digital formats first. In **digital recording**, sound (whether in the form of music, speech, or sounds) is transformed into binary information—a series of 1s and 0s, the same mathematical code used in computers.



Students can use software to assist them in composing their own music while they develop an understanding of music theory.

Corbis RF

Digital audio encompasses a variety of storage formats and ways to access the files such as streaming and podcasting. Educational materials in digital audio format can be purchased on compact discs, downloaded or streamed in the MP3 format, downloaded as WAV files from the Web, or created by you or your students. Digital recordings are then played back on a variety of players.

DIGITAL AUDIO

Digital files are preserved on digital storage devices such as a CD, a computer hard drive, a flash drive, or a handheld digital recorder. The digital files are typically saved in MP3 or WAV format.

Compact Disc. Compact disc (CD) technology is a standard format in educational settings. The CD stores music or other sounds as digitized bits of information and can hold up to 80 minutes of audio information. Users of CDs can quickly locate selections on the disc and program them to play in any desired sequence. Information can be selectively retrieved by learners or programmed by the instructor. A major advantage of the CD is its resistance to damage. Stains can be washed off, and ordinary scratches do not affect playback. If a scratch does affect the quality of the audio signal, a resin is available to repair the disc.

Many computers are equipped to create or "burn" audio CDs, making it easy for teachers and students to create CD recordings. Copyright restrictions need to be checked when including prerecorded material or music (see Copyright Concerns: Music).

MP3. Audio files in the MP3 (MPEG Audio Layer 3) format use audio compression to shrink large audio files into

smaller sizes that can quickly and easily be captured on the Internet. MP3 audio compression technology reduces upload and download time along with amount of storage space. As an "open" standard, MP3 is available to anyone with access to the Internet. The software your computer needs to use MP3 audio files is free to the user. Many audio files are also free or available for download at low cost from many subscription-based websites or at pay-as-you-go sites such as Apple Computer's iTunes Music Store.

MP3 is a way for audiophiles to enjoy their favorite pieces of music and to obtain the newest versions of a particular artist's songs. Some Internet sites let the users customize their selections so they can create unique "albums." On the downside, a word of caution related to copyright. Not all Internet sites make legal copies of music available. It is the responsibility of the user to respect the copyright laws related to audio (see Copyright Concerns: Music).

WAV. At one time the most common way to store and use audio, **WAV** files are digital versions of analog audio created by using a computer sound card and software to convert and store the file in digital format. WAV audio files can be stored on any digital storage device such as a CD, flash drive, or network drive for individual playback on a computer. Advantages of the WAV file format include the high quality of the audio files and the use of multiple channels for the sound. The limitation of WAV files is their very large size, meaning that most WAV audio clips must be short in duration. When audio files are stored as WAV format, you must first download the entire file before you can play it.

ANALOG AUDIO

Typically in the form of audiocassette tapes, analog audio is still a commonly used resource in today's classrooms for



Music

The use of music is the most highly regulated activity in the realm of copyright law. It is also heavily policed and enforced by the music industry!

Permitted copying of music includes the following:

- For academic uses other than performances, teachers and students may make copies of up to 10 percent of a musical work, provided the excerpt does not comprise a part of the whole that would constitute a performable unit such as a section, movement, or aria.
- Single copies of a recording of student performances may be made for rehearsal purposes or evaluation.
- Single copies of a recording, such as a CD or cassette, of copyrighted music may be made from a recording owned by a school or teacher for the purpose of constructing aural exercises or assessments.

The following are prohibited:

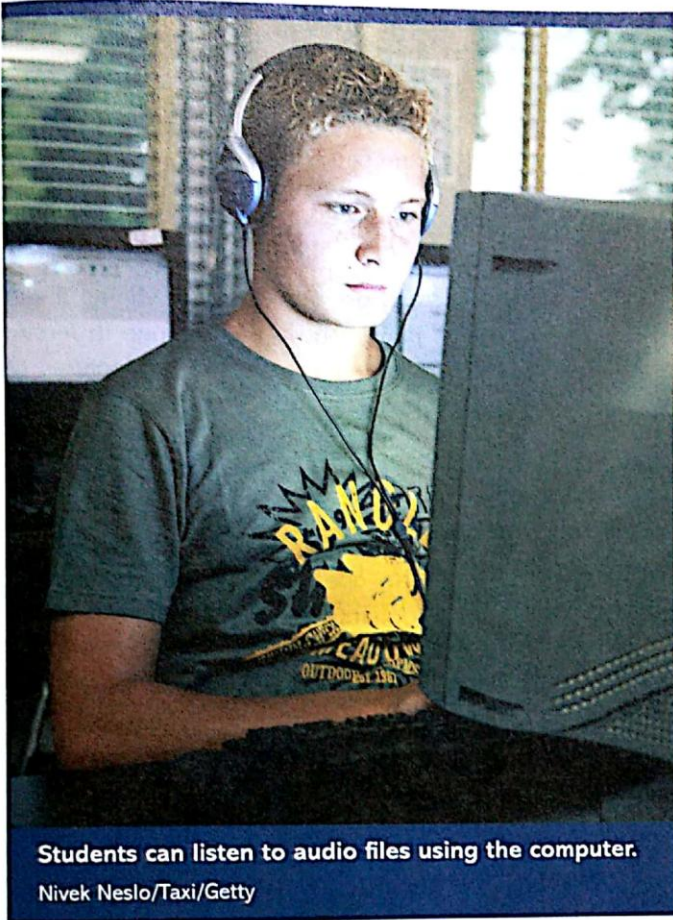
- Making an anthology, compilation, or collective work.
- Making copies of printed music scores. Additional copies must be purchased or duplication rights negotiated.
- Making an arrangement of a copyrighted musical work without permission of the copyright holder. This falls into the category of creating a derivative work.
- Performing a musical work publicly without the copyright owner's permission.



- Copying music from a website. You must also pay for the use of music you download from the Internet. The copyright owners of sound recordings have rights set forth in the Digital Performance Right in Sound Recordings Act of 1995 and the Digital Millennium Copyright Act of 1998. These laws give sound recording copyright owners rights to online performances of their recordings.

Internet transmissions may involve the reproduction and distribution of musical works and the copying of a copyrighted musical work or sound recording onto your server or hard drive (as when you load the file containing the work). Unauthorized copying constitutes exploitation of the reproduction rights. You must contact the copyright owner of the sound recording (usually the distributor) for authorization to copy the sound recording onto your server or hard drive. Some Internet sites advertise music free from copyright. You are wise to check out sites that offer music files, as it is better to ask than to be caught with illegal copies of music.

The landmark litigation between the music industry and the Napster online music sharing service in early 2000 is a prototypical example of efforts to ensure that copyright holders receive proper remuneration for all commercial transactions involving their work.



Students can listen to audio files using the computer.

Nivek Neslo/Taxi/Getty

reading centers, activity kits, and personalized instruction. Audiocassettes allow you and your students to record your own tapes easily and economically. When the content becomes outdated or no longer useful, you can erase the magnetic signal on the tape and reuse it. The cassette is durable, easy to use, not easily damaged, and stores easily.



Some digital recorders have built-in USB connectors to make it easy to download files to the computer.

Shutterstock

There are a few drawbacks to cassettes. For instance, longer tapes, particularly C-120s, sometimes become stuck or tangled in the recorder because of the thinness of the tape. Unless the content on the tape is unique and of considerable value it is advised to transfer the content to a digital format and discard the tape.

Quickly replacing the audiocassette recorder is the digital audio recorder. The frequency response and overall quality (fidelity) of cassette playback units are not as good as those of digital players and repairing them is often more expensive than purchasing a new higher quality digital recorder. And the digital recorder can store larger files.

ACCESSING AUDIO

You can access and listen to digital audio files in a variety of ways, including streaming audio, podcasting, Internet radio, and digital players.

STREAMING AUDIO

Audio files available as **streaming audio** are sent in packets to your computer, allowing you to listen to the first part of the file while the rest is being temporarily downloaded. Streamed MP3 is available to anyone with a computer and access to the Internet. The software your computer needs to play MP3 audio files, like Windows Media Player and iTunes, is free and typically comes installed on most computers.

PODCASTING

Podcasting (from the words *iPod* and *broadcasting*) refers to recorded audio files in MP3 format that are distributed over the Internet. These audio files can be sent automatically to “subscribers” and stored in their computers for listening at their convenience. These files need to be completely downloaded before you can listen to them. With podcasting software, students and teachers can create their own newscasts or documentaries and allow subscribers to download and listen to them on their computers or portable audio players (Figure 9.2).

Podcasts differ from traditional Internet audio in two important ways. In the past, listeners have had to either tune in to web radio on a schedule or they have had to search for and download individual files from webpages. Podcasts are much easier to download and can be listened to at any time because a copy is on the listener’s computer or portable audio player. They can be automatically delivered to subscribers, so no active downloading is required. Podcasting is functionally similar to digital video recorders (DVRs), such

sound files, which are copied by connecting to a computer.

As with audiocassettes and CDs, educational applications include audio presentations, music related to courses, talking books, historical speeches, symphonies, and conversational foreign languages. You can use your portable digital audio player and a microphone to record audio files, from class lectures to poetry readings. Every curriculum comes alive when audio is part of the instruction, with endless possibilities for PK–12 education.

The portable digital audio player also opens up exciting new options for language learners. For example, students can record and rerecord reading selections and submit the electronic files to their teachers for evaluation. Students can also practice oral presentations, as well as speaking in the foreign language they're studying to assess their own speaking skills. Teachers can use them to dictate lesson plans and research notes or record to-do lists as they think of them.

Figure 9.2

Using Podcasts to Support Student Learning

Source: www.podcastalley.com/index.php

as TiVo, that let users record and store television programs for later viewing.

Podcasting offers teachers and students remarkable opportunities for their voices to be heard in their local communities or around the world. One could think of podcasting as blogging without writing or as a way for every class to have its own radio station.

INTERNET RADIO

Internet radio refers to radio stations on the Internet that can offer a variety of programming—music, sports, science, weather, and local, national, and world news. Live and recorded programming from around the world playable on classroom computers can enhance language, social studies, science, and current events lessons.

PORTABLE DIGITAL AUDIO

A **portable digital audio player** enables users to take their audio files with them. It is also called a “portable digital music player” because most people today use them to play music. An example is the Apple iPod. Despite fitting easily into the user’s hand or pocket, it can store thousands of songs or

ASSURE Case Study Reflection



PEARSON
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Review the ASSURE Classroom Case Study and video at the beginning of the chapter. How might Mr. Aina Akamu involve his students in using different audio formats, such as MP3, audio streaming, or podcasting to demonstrate “What it means to be Hawaiian”? Describe the advantages and disadvantages for students using each format.

AUDIO RECORDER

Audiocassette and digital recorders are readily available and very easy to operate. Some students have been using them since they were small children. Even very small children enjoy recording their voices and playing them back. Another common use of audio recorders for young children is to play

a prerecorded narration of a storybook as the children follow along in the book.

Cassette players/recorders are “plug-and-play.” Simply insert the cassette tape and it is ready to play. Switch the cassette player on and students can listen to what is recorded on the tape. With a digital player/recorder, there are no tapes to be handled. Add a microphone and students can record their voices or other sounds.

CREATING AUDIO

Audio recording technologies allow students to dictate notes, practice foreign languages, or conduct interviews within the community. More than a music player, audio equipment is now a portable tool for dictation and sound recording, taking and hearing notes, and listening to audio books and newspapers. Creating “radio programs” with music and narration can capture students’ attention and motivate their creativity in a digital world.

MUSICAL INSTRUMENT DIGITAL INTERFACE

Musical Instrument Digital Interface (MIDI) technology allows students to create music by focusing on musical ideas rather than the mechanics of playing an instrument or learning musical notation. With relatively inexpensive technology that can be plugged into most computers, MIDI and music composition software like Apple’s GarageBand allow students to exercise their “musical/rhythmic” intelligence, one of Gardner’s (2006) nine aspects of intelligence. MIDI technology lets students create music as easily as word processing facilitates writing. Rather than using conventional musical notation, this technology uses lines of sound on a grid whose height corresponds to pitch and whose length corresponds to duration.

DIGITAL SYNTHESIZER SOFTWARE

With digital synthesizer software, students can create original music, “radio programs,” and materials for their



Students can record and edit digital audio files on a computer.

Diane Bondareff/AP

portfolios. They can produce their own audio presentations using software that gives student productions a “professional polish.”

It seems everyone wants to podcast these days. Creating podcasts using digital synthesizer software puts your students in the control room of their own full-featured radio station. Software such as Mixcraft (see Figure 9.3) includes



Figure 9.3

Mixcraft

Acoustica’s Mixcraft is one example of digital synthesizer software that allows students to add and modify prerecorded music from a wide variety of instruments, music played by the students, or music from other sources, when within copyright guidelines.

Source: www.acoustica.com/mixcraft. Reprinted by permission.

sound effects and jingles from an audio library. Students can browse and select from various stored sounds—including sounds of people, animals, and machines, which they click and drag into their podcast to sync up with the vocal track.

ASSURE Case Study Reflection



PEARSON
myeducationkit™

Review the ASSURE Classroom Case Study and video at the beginning of the chapter. How could Mr. Akamu's students add self-created digital music to their presentations? What guidelines would Mr. Akamu need to provide his students to ensure that creating the music was aligned to and assisted students in achieving the knowledge outcomes for the lesson?

ADVANTAGES

- *Readily available, simple to use, and portable.* Most students have been using CD players, audiocassette recorders, and MP3 devices since they were very young. These types of players are easy to operate and portable; they can even be used “in the field.” Portable audio devices are ideal for home study, and many students already have their own players.
- *Inexpensive.* Once the storage devices and equipment have been purchased, there is no additional cost because the storage devices are erasable and reusable. Individual audiocassettes are inexpensive. In the case of MP3 files, many are available on the Internet for free or at low cost.
- *Reproducible.* You can duplicate audiotapes and digital files with the appropriate software and equipment. You can easily duplicate audio materials in whatever quantities you need, for use in the classroom, in the media center, and at home. Remember to observe copyright guidelines.
- *Provides verbal message to enhance learning.* Students who have limited reading ability can learn from audio media by listening and following along with visual and text material. And they can replay portions of the audio material as often as needed to understand it.
- *Offers current information.* Web-based audio is often a broadcast of live speeches, presentations, or performances.

- *Ideal for teaching second languages.* Audio resources are excellent for teaching second languages because they not only allow students to hear words pronounced by native speakers, but also enable them to record their own pronunciations for comparison.
- *Stimulating.* Audio media can provide a stimulating alternative to reading and listening to the teacher, presenting verbal messages more dramatically than text can. With a little imagination on your part, audio can be very versatile.
- *Resistant to damage.* CDs do not have tape to tangle and break. Stains can be washed off, and ordinary scratches do not affect playback. MP3 files can be stored on a computer hard drive, USB drive, or MP3 player.

LIMITATIONS

- *Copyright concerns.* Commercially produced audio can easily be duplicated, which might lead to copyright violations.
- *Doesn't monitor attention.* Some students have difficulty studying independently, so when they listen to recorded audio their attention may tend to wander. They may hear the recorded message but not listen attentively and comprehend. Unlike teachers, an audio player cannot readily detect when students are drifting away from a lecture.
- *Pacing.* Determining an appropriate pace for presenting information can be difficult if your students have a range of attention spans and experiential backgrounds.
- *Fixed sequence.* Audio media fix the sequence of a presentation even though it is possible to hear a recorded segment again or advance to an upcoming portion. It is difficult to scan audio materials as you would text materials. CDs do not share this limitation, which is why this format plays a significant role in instruction.
- *Difficulty in locating segments.* It is sometimes difficult to locate a specific segment on an audiotape. Counters on the recorders assist retrieval, but they are not very accurate. CDs give much easier accessibility to specific selections.
- *Potential for accidental erasure or deletion.* Audiotapes can be erased easily, which can be problematic. Just as they can be quickly and easily erased when no longer needed, they can be accidentally erased when they should be saved. Be sure to remove the record lockout tab of any cassette you wish to safeguard. Because they are magnetic, audiotapes must be kept away from magnets, which can cause erasure.

ASSURE Case Study Reflection



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Review the ASSURE Classroom Case Study and video at the beginning of the chapter. How can Mr. Akamu use audio in his students' development of their presentations? What type of audio information can he prepare in advance? Can his students prepare audio for their "What it means to be Hawaiian" presentations?

INTEGRATION

The uses of audio media are limited only by the imaginations of you and your students. You can use audio media in all phases of instruction—from introduction of a topic to evaluation of student learning. Perhaps the most rapidly growing

general use of audio media today is for self-paced instruction. Students with learning disabilities can go back and repeat segments of instruction as often as necessary because the playback capability is a very patient tutor. The accelerated student can skip ahead or increase the pace of instruction.

Prerecorded audio materials are available in a variety of subjects. For music classes, CDs can be used to introduce new material or to provide musical accompaniment. The sounds of various musical instruments can be presented individually or in combinations. In preschool and primary grades, tapes and CDs can be used for developing rhythm, telling stories, playing games, and acting out stories or songs. A common application of audio media is in learning centers. Sometimes these are even referred to as "listening centers" because of their use of audio-based materials.

Adding audio files is relatively easy if you have the right equipment and enough memory on the computer as audio files can be quite large unless compacted. PowerPoint even has audio files included in the software package. Using a CD or audiotape, audio files can be created using a program

collaboratively in a motivating way that helps them with reading and vocabulary competencies.

Joy Stories

www.joystories.com

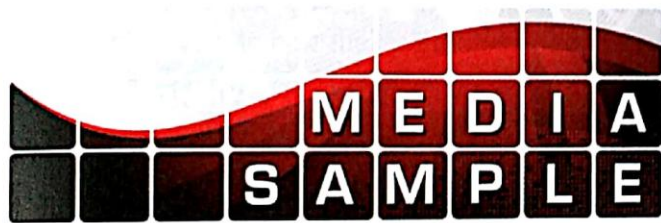
Available in both English and Spanish, this collection of short stories has been developed to help children gain personal insight and positive self-image. Presenting issues such as diversity, determination, and disappointment, these creative stories are designed to help children view their own personal challenges in a new light.

A Kid's-Eye View of the Environment

www.mishmashmusic.com

Michael Mish based this series of songs, available on CD or as an MP3 download, on his many visits to schools in southern California to talk to children about the environment. He found them to be more aware and concerned about environmental problems than he expected. Mish took the topics that the children were most concerned about (e.g., recycling, water and air pollution, and the greenhouse effect) and put them to music. The songs are engaging, with sing-along choruses. The messages should get primary-age children talking about making this a safer, cleaner world.

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Audio

LibriVox

<http://librivox.org>

Audiobooks from the public domain are available with titles ranging from classics to short stories and poetry. The collection is based on voluntary submissions of audio media, but the entries must all be copyright free. Over 12 languages are available, with native speakers reading familiar books.

Audio Theatre Production Kit

www.balancepublishing.com

Students can create their own audio theatre productions. The kit contains two versions of a script, one with altered vocabulary to meet the needs of below-grade readers, the second for grade-level and above-grade-level readers. In addition, there is a CD with background music and sound effects. Students, working together, record their production for later sharing. They develop technical skills while working

WHEN to USE Audio

Use when student learning will be enhanced by . . .

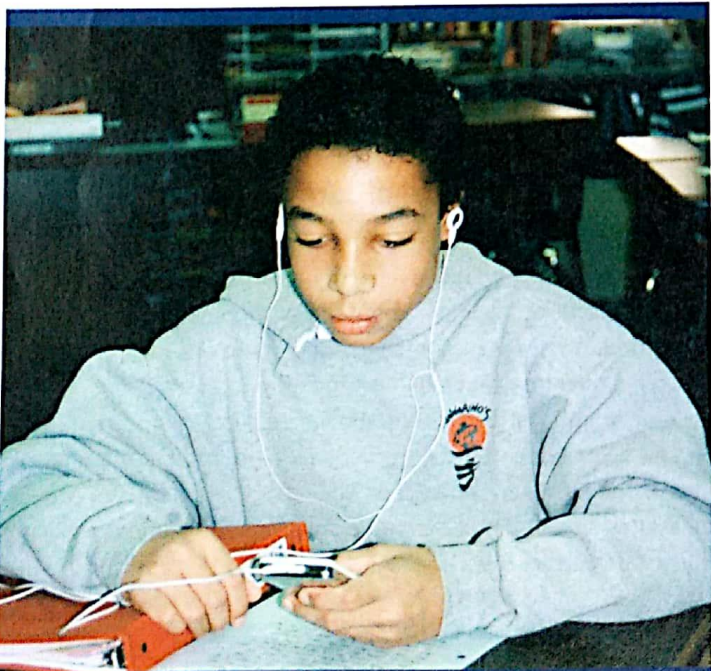
Guidelines

- text being read
- listening to key political speeches
- recording impressions
- easy access to verbal examples
- listening to an author reading her story
- hearing the sounds of nature
- listening to an expert
- listening to current events
- recording personal reading

Examples

- High school students with limited reading ability listen to a recorded reading of a Shakespeare sonnet.
- Middle school students prepare for a debate by listening to podcasts of speeches given by candidates for mayor of their city.
- Students create a digital journal by recording monthly impressions of their most important learning experiences.
- Students use the "Noun" menu of a Spanish-language CD to listen to new vocabulary pronounced by a Spanish speaker.
- As a story is being projected on a screen, elementary students listen to the author reading it in a streamed recording from a children's storybook website.
- Intermediate-grade students use a bird website to practice identifying sounds of different birds from their local area to prepare for a nature trail field trip.
- Students in an art class listen to a CD recording of a successful photographer sharing tips for taking balanced photos.
- A social studies teacher plays an Internet radio broadcast of a recent presidential address.
- Elementary students create a digital reading journal that contains recordings of students reading favorite stories.

such as SoundEdit. Using a microphone and SoundEdit, the teacher or student can create original audio to enhance the information presented. The process for creating a digital audio file is similar to that of creating an audiotape.



Students can study music and other content areas using prerecorded audio media.

Valerie Schultz/Merrill

ASSURE Case Study Reflection



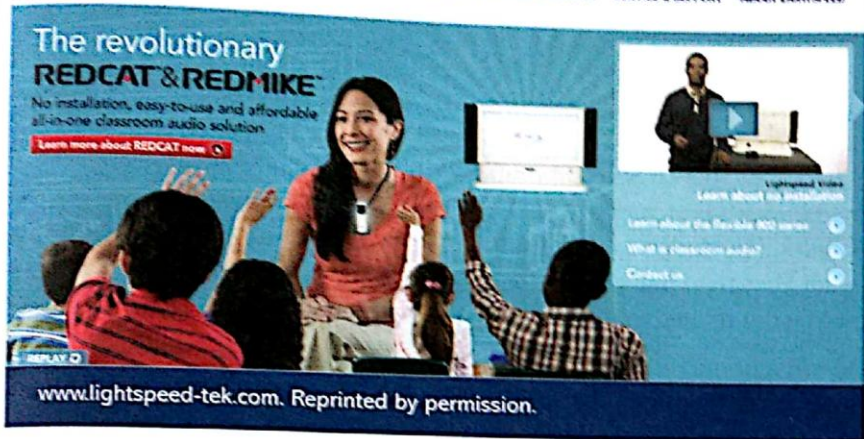
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Review the ASSURE Classroom Case Study and video at the beginning of the chapter. How can Mr. Akamu's students use audio as a component of a multimedia project? What guidelines should he give his students to ensure the audio enhances the overall project?



WE CAN HEAR YOU!
Classroom Voice Amplification Systems

The 21st century classroom is moving to an audio technology system that optimizes the listening environment for all



identified learning difficulty (Crandell, Smaldino, & Flexer, 2005).

SUMMARY

This chapter stressed the importance of audio in teaching and learning. After discussing the hearing and listening process in some detail, including techniques for developing listening skills, we explored a variety of ways to use audio in the classroom, describing both digital and analog audio formats. Throughout the chapter we discussed many techniques for selecting various audio formats and materials, as well as techniques for producing and editing audio materials. We described

audio media's distinct advantages and limitations and offered guidelines for integrating audio into instruction.

students. A lightweight wireless teacher's microphone links to a set of speakers strategically placed around the classroom. The end result is a quality listening setting that helps engage students and supports student learning and performance.

Using voice activation solutions for the amplification, the system only raises the volume level of the teacher's voice slightly above the ambient room noise. In a noisy classroom, when it is often hard to hear the teacher, her voice is amplified just a little but the end result makes it easier to listen. And there is evidence that all students benefit from the amplified sound, including those with hearing problems, students with learning disabilities, students for whom English is their second language, and even those students who have no

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To check your comprehension of the content covered in Chapter 9, go to the **MyEducationKit** for your book and complete the Study Plan for Chapter 9. Here you will be able to take a chapter quiz, receive feedback on your answers, and then access resources that will enhance your understanding of the chapter content.

ASSURE Lesson Plan

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The following ASSURE Lesson Plan provides a detailed description and analysis of the lesson in the ASSURE Classroom Case Study and video at the beginning of the chapter. To review the video again, go to the MyEducationKit for your text and click on the ASSURE Video under Chapter 9. The video explores how Mr. Akamu creates a high school communication lesson that incorporates audio.

This chapter's ASSURE Classroom Case Study describes the instructional planning used by Mr. Akamu, a high school advanced speech and communications teacher, for developing an end-of-course project. Mr. Akamu wants his students to create group presentations depicting

"What it means to be Hawaiian." The presentations are to include oral speaking, a PowerPoint presentation, and an iMovie that contains interviews of native Hawaiians.

Analyze Learners

The students enrolled in Mr. Akamu's advanced speech and communications course are 16 and 17 years old. The learning ability of these students is at or above grade level. None of the students are identified as having learning disabilities. His students come from primarily moderate to low socioeconomic environments and are all Hawaiian natives. For the most part, the students are well behaved and have a high interest in work related to their culture and backgrounds.

Entry Competencies. The high school students are, in general, able to do the following:

- Create, edit, and record digital audio files
- Navigate the Internet
- Create, edit, and save digital video with iMovie
- Create PowerPoint presentations

Learning Styles. Students are fairly sophisticated and prefer to work in groups. They enjoy incorporating the use of technology and media into their coursework. Most of the students like to use audio and video because it allows them to be creative and to produce work that expresses their personal opinions. However, some of the students prefer to input their thoughts as written text and oral expressions. Most of Mr. Akamu's students learn best in a relaxed atmosphere that encourages group discussions and movement between activities.

State Standards and Objectives

Curriculum Standards. National Council of Teachers of English 7: Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

Technology Standards. National Educational Technology Standards for Students 2—Communication and Collaboration: Students use digital media to communicate and work collaboratively to support individual learning and contribute to the learning of others. Reprinted with permission from *National Educational Technology Standards for Students* © 2007, ISTE (International Society for Technology in Education, www.iste.org). All rights reserved.

Learning Objectives

- Produce a PowerPoint presentation that reflects a basic, personal understanding about being a contemporary Hawaiian.
- Develop an interview protocol and conduct interviews with people about Hawaiian identity.
- Given equipment and software, shoot, edit, and produce a 2-minute iMovie about Hawaiian identity.

Select Strategies, Technology, Media, and Materials

Select Strategies. In considering the content of the lesson, “What it means to be Hawaiian,” Mr. Akamu realizes that his students need to gather much of the information from interviews with Hawaiian natives. Therefore, one of the key strategies is for students to conduct Internet searches and brainstorm ideas about the topic. Students use this information to develop questions for their interviews. Another lesson strategy is for students to collaboratively create storyboards for their PowerPoint presentations and their iMovies. Student groups plan the final presentation by assigning the following roles: (1) furnish an oral overview, (2) present information on the PowerPoint slides, (3) provide an introduction to the iMovie, and (4) offer concluding remarks.

Select Technology and Media. This lesson involves student use of computers, digital audio recorders, digital video cameras, and PowerPoint and iMovie software. Mr. Akamu selects digital audio recorders because students need to save the interviews in a digital format that can be imported into their iMovies. The digital format is also necessary to enable editing with iMovie software. Mr. Akamu selects PowerPoint software because it provides enough flexibility for students to import interviews, music, and photographs into their presentations. He uses the following guidelines to assess the appropriateness of his technology and media selections:

- *Alignment with standards, outcomes, and objectives.* The digital audio recorders and video cameras allow students to record, transfer, and edit interviews and videos to create presentations that demonstrate achievement of the objectives.
- *Accurate and current information.* Mr. Akamu instructs his students on guidelines for collecting accurate and current information when conducting Internet research.
- *Age-appropriate language.* PowerPoint and iMovie menus are written at a level that requires initial training for high school students and ongoing support during use.
- *Interest level and engagement.* The combined use of student-created PowerPoint and iMovie presentations provides students the opportunity to express their creativity through the production of a unique oral presentation.
- *Technical quality.* The digital audio recorders, digital video cameras, and PowerPoint and iMovie software are reliable and of high quality.
- *Ease of use.* After basic skills training, the high school students are able to use the digital audio recorders, digital video cameras, and PowerPoint and iMovie software.
- *Bias free.* PowerPoint and iMovie are bias free.
- *User guide and directions.* The online help features of PowerPoint and iMovie are suitable for use by high school students, as are the user’s guides for the digital recorder and camera.

Select Materials. The materials for this lesson include an overview and assignment handout and a presentation rubric created by Mr. Akamu. The overview and assignment sheet includes a description of the lesson purpose, the student objectives, presentation guidelines and format, important dates, responsibilities for group members, and the project calendar. The presentation

rubric includes two ratings for each group: one for the individual student speaker and one for the group as a whole. The criteria for individual speakers include rapport, voice, fluency, body, and content. The speakers are rated on a scale from 1 to 5, with 5 being the best rating. The group evaluation is based on ten criteria of successful presentations. For example, the first criterion states, "The presentation was introduced in an engaging and appealing manner. The presenters kept my attention throughout the speaking portion of their presentation." Another says, "The information presented was credible and believable. Multiple perspectives were shared and included in the presentation." Mr. Akamu along with student peers and guest evaluators attending the presentations complete the rubric.

Utilize Technology, Media, and Materials

Preview the Technology, Media, and Materials. Mr. Akamu previews the digital audio recorder and camera features and the PowerPoint and iMovie software to ensure they have the features needed for students to create their presentations.

Prepare the Technology, Media, and Materials. Mr. Akamu checks the digital audio recorder and the camera to ensure they are working. He ensures the computer lab is reserved and makes copies of the handouts.

Prepare the Environment. He prepares the digital audio recorders and video cameras for checkout to the students. He ensures that the lab computers have PowerPoint and iMovie installed and that they are functional. He sets out the student handouts.

Prepare the Learners. Mr. Akamu shows his students how to use the digital audio recorder, digital video camera, and PowerPoint and iMovie software prior to the lesson.

Provide the Learning Experience. Mr. Akamu begins the lesson with a discussion on "What it means to be Hawaiian," to show the variety of possible responses. He talks about the differences in how the students view being Hawaiian as compared to their grandparents. He introduces the power of capturing stories with audio recording. Then Mr. Akamu presents students with the assignment for their final class project.

Require Learner Participation

Student Practice Activities. The students use the digital audio recorder and digital video camera to capture family and community member ideas about "What it means to be Hawaiian." Students work in groups to combine the audio and video into a presentation that includes a PowerPoint presentation and an iMovie. The presentation provides the group's perception of "What it means to be Hawaiian" and provides information that supports their opinions.

Feedback. Mr. Akamu designs the lesson to include feedback as a major component of the unit. Since this is an advanced speech and communications course, the audio and video presentation is the product that is assessed. Students receive feedback from each other, the teacher, and guest evaluators who attend the presentation.

Evaluate and Revise

Assessment of Learner Achievement. Mr. Akamu uses the combined rubric ratings from students, guest evaluators, and his own ratings when assessing the learning of each student. He also evaluates the final products against the criteria listed in the assignment sheet.

Evaluation of Strategies, Technology, and Media. To evaluate the strategies, technology, and media, Mr. Akamu informally interviews the guest evaluators and his students to gain insight and ideas for improving the lesson.

Revision. Suggestions for revision given to Mr. Akamu include students working individually to ensure each student develops her or his own perception of "What it means to be Hawaiian." Another is to focus the lesson on family members to gain insight into a family's Hawaiian culture. A third revision suggestion involves students in developing a "What it means to be Hawaiian" website with student-created interview podcasts, iMovies, and photographs.

C

ONTINUING MY PROFESSIONAL DEVELOPMENT

Demonstrating Professional Knowledge

1. Explain the differences between hearing and listening.
2. Identify four areas of breakdown in audio communication. Specify the causes of such breakdowns.
3. Describe four techniques for improving listening skills.
4. Describe the most common types of digital and analog audio media used for instruction. What are the advantages and limitations of each type?
5. Illustrate one possible use of audio media in your teaching field. Include the subject area, audience, objective(s), role of the student, and evaluation techniques to be used.

Demonstrating Professional Skills

1. Obtain commercially prepared audio materials and appraise them using the Selection Rubric: Audio Materials. (ISTE NETS-T 2.A)
2. Develop a short oral history of your school or organization by interviewing people associated with it for a long time. Edit your interviews into a five-minute presentation. (ISTE NETS-T 3.C)
3. Use an audio format to collect your thoughts and ideas about what it means to use technology in your teaching. Listen to your narration after a few entries.

What have you learned about your ideas? How does keeping your ideas on audio impact your collection of reflections? Would you consider your audio materials

to be a variation of a written journal? Why or why not? (ISTE NETS-T 5.C)

Building My Professional Portfolio

- *Creating My Lesson.* Using the ASSURE model, design a lesson for a scenario from the table in the Lesson Scenario Chart appendix or use a scenario of your own design. Use an instructional strategy that you believe to be appropriate for your lesson.
- *Enhancing My Lesson.* Enhance the lesson you created in the previous activity by describing how you would meet the diverse needs of learners and how you would integrate different types of technology and media. Specifically, describe additional strategies you would include for students who already possess the knowledge and skills targeted in your lesson plan. Also describe strategies, technology, media, and materials you could integrate to assist students who have not met the lesson prerequisites. Describe other types of technology and media that could be integrated into the instructional strategies. For students who have

- met most or all of the learning objectives for the lesson, one consideration is to have them develop a presentation about the topic of study using audio. Describe the factors they might consider in selecting appropriate audio for the presentation. What do you need to do to help them select and plan for the use of audio? (ISTE NETS 2.B, 2.C, 3.D, & 5.C)
- *Reflecting on My Lesson.* Reflect on the lesson you created and reflect on how you enhanced the lesson. Also reflect on the process you used and what you have learned about matching audience, content, strategies, technology, media, and materials. Address the following in your reflection: What audio materials were used? How can the audio enhance the learning experiences of your students? If you redesigned your lesson, what audio materials would you select and why? (ISTE NETS 5.C)

SUGGESTED RESOURCES

Print

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