

LESSON

19

Music and Technology

Step 1 · Starting With What I Know



Listing

How do the tools that artists use influence their work? Do advances in science give artists new tools to work with? For each type of artist listed below, write the names of two or three tools they might use.

Painter _____

Photographer _____

Architect _____

Musician _____



Synonyms

In the Word List below,

- circle the word that means “possible.”
- underline the synonym for “alter.”
- put X on the word that is similar to “duplicate.”
- put a star next to another word for “new.”
- draw a box around a word with the same meaning as “transform.”

Word List

novel change convert
feasible imitate

Syllabication

Write the word from the Word List box that best completes each sentence.



Word List

broadcast volume loudspeaker process

1. A two-syllable word that means “to send out by radio or television” is

_____ / _____ .

3. A two-syllable word that means “a series of actions leading to a result” is

_____ / _____ .

2. A three-syllable word that means “a device that converts electrical signals to sound” is

_____ / _____ / _____ .

4. A two-syllable word that means “the loudness of a sound” is

_____ / _____ .

On the lines below, write the word from the Word List that doesn’t belong with the other three and tell why.

Music and Technology

How much do you know about music? Do you think you can recognize the sounds of different instruments when you hear them in your favorite songs? Can you identify the sound of a piano or a saxophone? Well, don't be too sure! Your favorite music may not be coming from those familiar musical instruments at all. You may be hearing music generated with electronic instruments



Robert Moog

Early Experiments

Musicians are constantly searching for new sounds, novel instruments, and innovative ways of making music. It's no surprise to them that people have been attempting to use electricity to make music ever since electricity became commonly available. Even before the beginning of the twentieth century, engineers had invented electrical instruments called the Componium, the Electromechanical piano, and the Tonametric. In 1906, Thaddeus Cahill introduced an electrically powered instrument called the Dynamophone. It was impressive, but not very practical—it weighed about two hundred tons.

In the late 1940s, electronics influenced music in a different way. Pierre Schaeffer, a Paris engineer and broadcaster, used tape to create a whole new kind of music. It was called *musique concrète*. Schaeffer taped the sounds of railroad trains. Then he worked with the tape and altered the sounds. Schaeffer used everyday noises and electronics to compose a work he called *Railroad Etude*. The first broadcast of Schaeffer's *musique concrète* was known as a "concert of noises." The art of noise continued, with composers taping sounds of machines and nature as the raw material for their work.

Computer Music

In 1957, Max V. Mathews, an electrical engineer in New Jersey, began to wonder whether it was feasible to make music with a computer. His project at Bell Laboratories established the process for doing so.

It begins when composers write computer programs and **input** data. The computer carries out the programmed instructions and **converts** the results into electrical impulses. Then the **impulses** move to loudspeakers and are transformed into sound. Even in 1957, computers could do the same thing the composers of *musique concrète* had previously done with audiotape. Computers, though, could do it more quickly and easily.

In 1957, however, computers were large and not widely available. Since then, they have become more powerful, more **compact**, and less expensive. Now many composers write music on home computers, using either computer keyboards or musical keyboards.

The Synthesizer

Synthesizers, machines that duplicate sound waves to make all kinds of sounds, are one of the newest musical instruments. The first synthesizer appeared in 1955. It could **mimic** the sounds of traditional orchestra instruments. It could also make sounds that no other instrument can and give performances that are **physically impossible** for human performers.

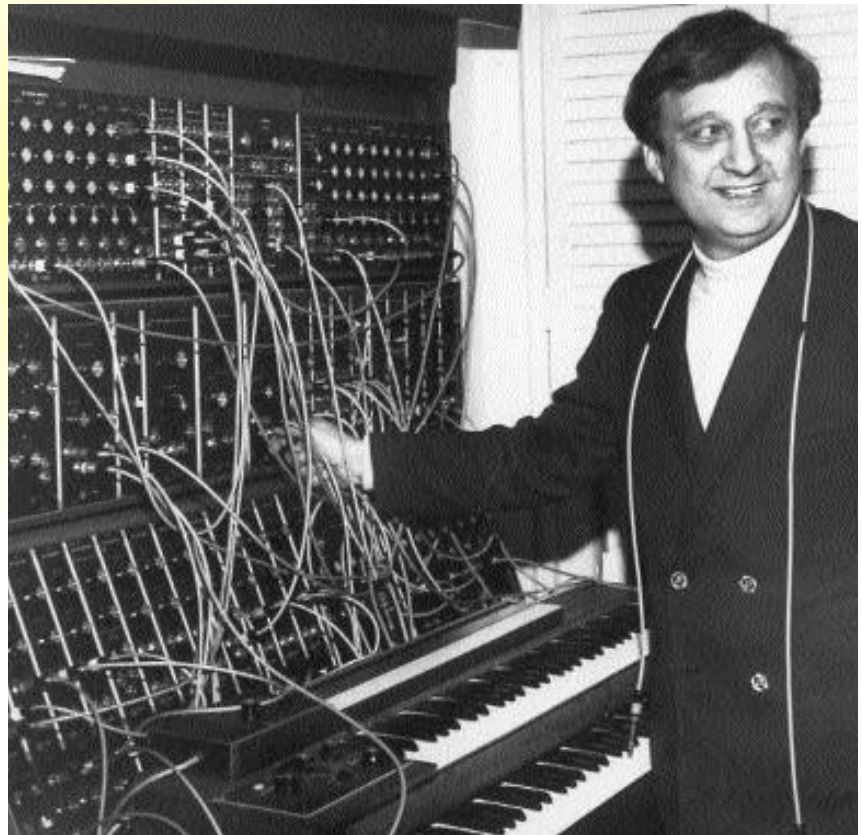
Like computers, synthesizers have developed over the years. By 1964, thirty-year-old Robert Moog had improved the synthesizer and made it as easy to use as a traditional keyboard. Today's synthesizers can do far more than the early synthesizers. They are smaller and inexpensive enough for many musicians and most small recording studios to afford. Composers of all kinds of music use synthesizers, but rock musicians, always ready to try out new ideas, use them more widely than anyone else.

Pronunciation Key

Moog
(MOHG)

musique concrète
(moo • ZEEK kahn • KREHT)

Railroad Etude
(RAYL • rohd AY • tood)



Even though the Moog synthesizer was monophonic sound engineers, such as the one shown here, could create hundreds of sounds never heard before.

Rock Music and Technology

From the beginning, rock musicians have rushed to develop new forms of music. Technology has been developing right along with rock, and rock musicians have been eager to use the new or transformed instruments. The guitar was electrified in the 1930s, and it is a good thing for rock musicians that it was. The sound of an electric guitar goes through a loudspeaker so the musician can control the **intensity**. Since rock music is often played in places where the audience is noisy, the musicians need to be able to turn up the volume.

Rockers also moved quickly from the piano to the electric organ. Then when the synthesizer came along, they were eager to find new ways to use it. The group Pink Floyd was one of the first to try out the synthesizer. Stevie Wonder used the synthesizer to create new sounds, too.

The Future

All kinds of musicians have used technology to stretch the definition of music. There is room in the world of music for classical electronic music, electronic rock, and music made from tapes of the sounds of such animals as birds and whales. As technology moves on, musicians will keep pace. At the same time, electronic music raises some interesting new issues.

The **technique** of recording sounds and **modifying** them is called **sampling**. When musicians first made *musique concrète* they sampled sounds

from nature or machinery. What happens, though, if a musician uses sounds from another performer's record? Who owns the music? Is the owner the performer who made the original recording or the composer who changed the sound and used it in a new way?

What about traditional musical instruments? Will people still want to learn to play them? It may be easier to learn to make the sounds on a synthesizer. Once you learn to use the synthesizer, you can imitate the sounds of all the other instruments. On the other hand, playing traditional instruments is an art. Great performers take pride in their talent, and people who play instruments for fun play partly because they enjoy the challenge. Will people continue to make music as we know it today? How do you think technology will influence the future of music?

Did you know?

Jeff Beck was the lead guitarist for a famous rock group called the Yardbirds, but he left because he wanted to experiment with new kinds of music. His experiments led him into the field of electronics. Beck invented the "talking box," a tube that runs from the player's mouth to the guitar.

Then the guitar is connected to a synthesizer. The guitar of a musician who uses the talking box seems to be singing its part in a human voice.

Keeping Sharp

Word Analysis

Mark each word that has a prefix with **P**. Mark each word that has a suffix with **S**. Keep in mind that some words will fit both categories. Mark such words with both letters.

compact	_____
impulse	_____
convert	_____
synthesizer	_____
innovative	_____
feasible	_____



Jeff Beck, inventor of the "talking box"

Step 3 Refining and Extending Knowledge

Self-Assessment

Part A: Look at each word listed below. If you don't know the word or if you aren't sure about it, write 1 on the line.

Part B: If you are sure you know the word and can use it in any situation, write 2 on the line.

The words with 1s are the words you need to study.

_____	alter
_____	compact
_____	convert
_____	feasible
_____	generate
_____	impulse
_____	innovative
_____	input
_____	intensity
_____	mimic
_____	modify
_____	novel
_____	process
_____	synthesizer
_____	technique

Other Interesting Words

Add any other words from the article you think you need to study or would like to know.

_____	_____
_____	_____
_____	_____

Comprehension: Reading for Detail

Draw a line from each inventor to his invention. Then write numbers on the lines provided to show who came first, second, third, and fourth.

___ Max V. Mathews	<i>musique concrète</i>
___ Pierre Schaeffer	synthesizer
___ Robert Moog	dynamophone
___ Thaddeus Cahill	computer music

Completing Sentences

Using your knowledge of music and technology, circle the word that best completes each sentence below.

- The sound of an electric guitar comes through a loudspeaker so the musician can control the ____ .
pitch intensity impulse
- Computers have become more powerful more ____, and less expensive.
compact novel convert
- Max V. Mathews established the ____ for making computer music.
data impulse process

Multiple Meanings

Circle the letter of the phrase that best completes each sentence.

- Yes, **volume** can refer to a book, but in the article the word means ____ .
a. the frequency of a sound
b. the loudness of a sound
- Yes, an **impulse** can be a sudden wish or urge, but in the article the word is used to describe ____ .
a. a piece of data
b. a surge of electrical energy
- Yes, an **engineer** can be a person who operates a train, but in the article it means ____ .
a. a trained technical professional
b. a skillful musician

Step 4 · Applying What I've Learned



Comprehension: Identifying Detail

Use what you've learned to finish the outline below. For each musical technology listed below, write words and phrases from the article that tell who invented or perfected it, how it works, and what special characteristics it has. Write your words and phrases on the lines.

Musique Concrète

Pioneer: _____

How it works: _____

Characteristics: _____

Computers

Pioneer: _____

How it works: _____

Characteristics: _____

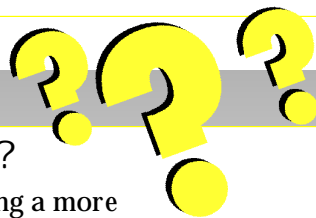
Synthesizers

Pioneer: _____

How it works: _____

Characteristics: _____

Now use the information you've collected to write a brief paragraph about one of the above.



Questions, Anyone?

Electronic music is becoming a more important part of the music scene. Here are some books about the topic:

- *Automated Music Composition* by Phil Winsor. University of North Texas Press, 1992.
- *A Guide to Computer Music: An Electronic*

Music Resource by Donald P. Kozak. Sound Management, 1992.

- *The Synthesizer* by John Bates. Oxford University Press, 1988.
- *Vintage Synthesizers: Ground Breaking Instruments and Pioneering Designers of Electronic Music Synthesizers* by Mark Vail. GPI Books, 1993.