

Microphones — The Basics

First course, First grading period, Week 2

Students must learn the basics of microphones. This includes their patterns, dynamics, and proper use. Beginning students should concentrate on the most basic usage — mono recording using a microphone such as an RE 50, which is omni-directional and very easy to use.

This lesson is taught in conjunction with “Minidiscs — The Basics.” Brian Jarboe, NPR engineer, contributed to this lesson.



Enduring Understanding

The ability to capture sound for on-air use is an essential skill in the radio industry.



Essential Questions

How does using certain types of microphones in certain situations capture the sound accurately? How does an omni-directional, all-purpose microphone work? How do you use and handle it? What can it do well? How does the microphone work with the minidisc player?



Objectives and Outcome

- Students will be able to use a basic reliable omni-directional microphone on a professional level.
- Students will be able to distinguish among the different microphones that are available and their best applications.
- Students will learn proper microphone placement.



Suggested Time

Two to three days with on-going practice all year



Resources and Materials

- Various microphones on display
- RE50 microphones and minidisc or other recorder
- Headphones
- Display of pickup patterns of various microphones (Cardioids, hypercardioids, omni directional, bi-directional, shotguns)

Microphone – Pickup patterns, Section III, “How They Work”
(http://arts.ucsc.edu/ems/music/tech_background/TE-20/teces_20.html)
Microphone Basics
(<http://home.houston.rr.com/psycle/edu/microphone.html>)

"The Microphone," *Announcing*, pages 102-107

"The Microphone," *Writing for Television, Radio and New Media*, page 30

"Microphones," *Radio Production*, pages 35-38



Procedure

1. Cover the basics of microphones. How they work in getting the signal to tape. The teacher should display various microphones and show their recording patterns so that students understand how a basic omni-directional microphone works compared with other more complicated microphones.

2. Using headphones, students can listen to each microphone when it is turned on and plugged into a minidisc (set on record) or through the board in the classroom to hear the differences in the microphone patterns. You can also play pre-recorded examples you have prepared. Very briefly discuss how each microphone is used.

Spend much more time on the RE50 and its capabilities as compared with the other microphones. First-year students should learn how to use this microphone to record a variety of sounds including their own voices, others' voices, and ambience. This is the microphone students will use in the first year and, in fact, for much of a radio production course.

3. Show students relevant photographs of proper microphone placement. Emphasize that holding the microphone in just the right spot is crucial.

4. As part of the classroom introduction to microphones make sure to discuss:

- Levels, over and under modulation
- Aural signs of poor microphone placement
- Placement of the microphone and how to hold it. The teacher should emphasize how placement of microphones is critical to good recording. This includes where to place it in relation to the mouth and what to do when students experience plosives and other signs that the microphone is not being used properly.

5. Cover how to handle a microphone, including the following list of do's and do not's:

- Do not blow into a microphone
- Do not bang it or drop it
- Do not move your hand around on it or on the stem or cord when recording; it will produce mic handling noise
- Do not position it directly in front of the mouth. You will get popped "p's and possibly distortion.
- Position the microphone about as far away from the mouth as between your thumb and little finger on a spread out hand.

6. Have students wear headphones at all times that microphones are used to record. Briefly touch on ambience including recognizing and collecting room and background ambience to match interviews that are collected in the field. Talk about unnecessary noise: computer hum, florescent lights, air conditioners, heaters, and what to do about them. Stress that if at all possible they should turn off unnecessary noise makers before starting to record or find another place that is quieter.

7. Explain to students how to properly connect the microphone to the minidisc player. If the microphone is a condenser, explain to students that external phantom power will be needed to power the mic. If it is a dynamic mic, it will not need this source of power. Make sure students know which cables they will need to properly connect the mic to the minidisc (MD). Most have a 1/8-inch input, or “miniplug” input, so they will need a cable that will have an XLR out from the mic to a miniplug to get into the MD.

8. Allow students to experiment with the microphone going into the MD. Show them how to adjust levels and emphasize how important it is to monitor levels while they are recording. Allow them to see how different the audio sounds when the microphone is placed at different angles and distances from the sound source. Note how poor mic placement and a higher record level brings up unwanted background noise.

9. All students should also get each person who is interviewed to identify himself and give his title (student name, grade, name of school, principal, director, president of name of company) on the tape before anything else is recorded. This stresses the importance of getting a proper identification and how microphones can be used as a note-taking device for proper writing later.

10. Play both poor and well done examples of recording to the class. Stress that this skill has a learning curve and everyone will get better. Explain and give suggestions for improvement. Explain that students can monitor what is recorded and may ask the person to say it again. Since they will be wearing headphones, for example, when they hear a popped “p,” they may ask the person to restate the sentence to correct it with an adjusted microphone placement.

Discuss the absolute necessity of getting one minute of place ambience: room tone, etc., in the clear wherever they record with no talking. This ambient tape smoothes out production mixes.

11. Send students out again with a copy of “Recording Checklist” upon which they will be evaluated.

If teachers began instruction with the basics of microphones, now present the basics of the minidisc.

At the end of the unit, students should have a good command of microphones, mic handling, placement, and its relationship with the minidisc player. Students should also be able to properly use the minidisc player in a proficient manner, being able to feed audio into it at good levels, while maintaining decent sound quality using the mic properly.



Homework

As homework have students study the rules of microphone use. Give them a quiz.

Each student checks out an RE50 and minidisc recorder. Each records samples of the following. If there is not enough equipment to allow this exercise to be done as homework, it may be performed during class time (in class and in the school’s hallways).

Each item should be a one-minute sample – enough to work with later:

- His or her own voice
- Another person else being interviewed in a quiet setting
- Another person else being interviewed in a noisy setting
- Ambience of the noisy setting
- Room tone
- A sample of something identifiable and of the student’s choice. Possibilities include a toilet flushing, a fountain flowing, the morning bell at school and the click of a classroom door closing.

Each student inputs what he has recorded into his own audio workstation personal folder. Create a new file titled Mic Test One for what is recorded and check it.



Assessment

After introducing students to the different microphones, give them a pop quiz to affirm what each student understands about the microphones that he or she will be using in the first courses.

On the first taping: Each student’s tape is loaded into the audio workstation and critiqued by the entire group with the teacher giving pointers of what was done well and what needs to be improved with specific impressions. No evaluative grade, but students receive credit for completing the assignments on time. When students work on projects later in the term, they may be graded on their ability to use microphones properly.

Assess improvement demonstrated on the second taping titled Mic Test Two. Evaluate students on the enclosed “Recording Checklist.”

Give a quiz on the do’s and don’ts of microphones and minidiscs (see above) The students should be able to list the rules.

If you are going to allow students to get extra credit, we advise it not be replacement for doing the class assignments. The procedures that are suggested are provided to teach students skills that they will need to be successful in the weeks — and years — that follow. A sample of possible extra credit assignments to accompany this lesson include:

Record three usual sounds and have the class identify them in 10 seconds. These might include school buses arriving or departing, students walking in a hallway, lockers slamming, and action taking place during a school game. Each selection should be no longer than 30 seconds and students should receive no credit if the selection is over- or under-modulated.



Academic Content Standards

National

Understand the principles, processes, and products associated with arts and communication media (McREL, Standard 1, Arts & Communication Career)



National Benchmark

Know skills used in electronic communications (e.g., producing audio recordings and broadcasts, producing video recordings and motion pictures). (McREL, Arts & Communication Career, Grades 9-12)

Industry Standards and Expectations

Comprehend the types of microphones, pick-up patterns, and techniques required for a variety of audio presentations. (Performance Element, Pathway KS Statement: Apply Knowledge of equipment and skills related to audio production, States' Career Clusters, National Association of State Directors of Career Technical Education Consortium)

The SkillsUSA Championships Technical Committee selected the following competencies as essential and to be demonstrated through their radio competition project:

- Demonstrate knowledge of audio production technology, safety procedures and trade terminology,
- Plan radio/audio production,
- Perform audio recordings and editing operations,
- Perform audio mixing, and
- Complete script.

The National Certification Committee of the Society of Broadcast Engineers suggests knowledge of the following in preparation for the engineering SBE certification examinations: NAB Engineering Handbook; FCC Rules, Code of Federal Regulations, Title 47 (Telecommunications), Parts 0-19, 70-79; and equipment manufacturers instruction manuals. (www.sbe.org/Ref_Engineer.php)

Recording Checklist

Name _____ Date _____ / _____ / _____

You will be evaluated on your recording proficiency in the following areas. Teachers will evaluate your tape to see if you have the following present. Your goal is to have the most “no’s” in the class.

- Yes No Presence of popped p’s
- Yes No Distortion
- Yes No Improper microphone placement
- Yes No Microphone handling noise
- Yes No Moved the microphone away before the person finished the sentence
- Yes No Failed to mic your questions
- Yes No Poor (low or hot) record levels
- Yes No Ambience — Is it too noisy in the background?
- Yes No Taped less than a minute of ambience when recording
- Yes No Forgot to get the ID of the person interviewed
- Yes No Forgot to adjust for poor microphone placement and did not ask person to state again if necessary
- Yes No Dubbing to audio workstation is at too high or too low a level

Minidisks – The Basics

First course, First grading period, Week 2

Students must learn how to record and play back audio on a recording device. The minidisc, a widely used industry standard, is inexpensive to purchase and easy to carry. It is also easy to damage and lose.

This lesson is taught in conjunction with “Microphones — The Basics.”



Enduring Understanding

The ability to record into a minidisc is a necessity. (Unless you choose a more expensive, complex method such as a DAT machine.)



Essential Questions

How does a minidisc work? What can it do and what are the pitfalls that can cause recordings to be distorted and unusable?



Objectives and Outcome

Students will be able to input (record) and play back (output) using a minidisc.



Suggested Time

Two days



Resources and Materials

Diagrams of various microphone patterns in mono and stereo
Various microphones on display
RE50 microphones and minidisks
Headphones

“Equipment,” *Announcing*, pages 129-137

“Editing practice,” *Radio Production*, pages 32-33



Procedure

1. Pick a brand and get the manual to become familiar with its unique capabilities. The basics of what most of them have in common will be covered in this lesson plan.

2. Introduce the minidisc the class will use. Stress that this is the minidisc that students will use during all radio production courses. You may want to use overheads of pictures from the manual for that model. Discuss:

- The line in and microphone inputs
- The line out and headphone jacks
- Laying down tracks
- Setting a level
- Seeing a level; hearing audio-input or output
- Battery usage

3. Cover how to use a minidisc, including this list of do's and do not's:

- These are fragile machines. Do not drop them.
- Make sure your microphone cord is securely in the machine when recording. You may want to lightly tape it with masking tape.
- Be very careful not to record over audio material. Go over this with your teacher individually if you need to.
- Make sure to position your minidisc carefully while you are recording so you can watch the levels and not drop the machine.

4. Play well-executed and poor examples of recording to the class so they will begin "responding" with their ears. Explain these examples (not the same ones as used with the microphone lesson) and ask students to give suggestions for improvement. Areas to discuss might include:

- Since they will be wearing headphones, what might students have caught if they had monitored what was recorded?
- What problems exist because of poor microphone placement?
- What problems exist because of failure to set a level?

Use this exercise to learn what students have retained from the lesson on microphone placement.

5. Send students out again with a copy of "Recording Checklist" upon which they will be evaluated.



Homework

As homework have students study the rules of microphone use. Give them a quiz.

Each student checks out an RE50 and minidisk recorder. Each records samples of the following. If there is not enough equipment to allow this exercise to be done as homework, it may be performed during class time (in class and in the school's hallways).

Each item should be a one-minute sample – enough to work with later:

- Their own voice
- Someone else being interviewed in a quiet setting
- Ambience of the noisy setting
- Room tone
- A sample of something identifiable and of the student’s choice. Possibilities include a toilet flushing, a fountain flowing, the morning bell at school and the click of a classroom door closing.
- Each student inputs what he has recorded into his own audio workstation personal folder. Create a new file for what is recorded and check it.



Assessment

On the first taping: Each student’s tape is loaded into the audio workstation and critiqued by the entire group with the teacher giving pointers of what was done well and what needs to be improved with specific impressions. No evaluative grade, but students receive credit for completing the assignments on time. When students work on projects later in the term, they may be graded on their ability to use microphones properly.

On the second taping: Evaluate students’ improvement on recording items on the enclosed “Recording Checklist.”

Give a quiz on the do’s and don’ts of microphones and minidisks (see above). Students should be able to list the rules.

If you are going to allow students to get extra credit, we advise it not be a replacement for doing the class assignments. The procedures that are suggested are provided to teach students skills that they will need to be successful in the weeks — and years — that follow. A sample of possible extra credit assignments to accompany this lesson include:

Record three usual sounds and have the class identify them in 10 seconds. These might include school buses arriving or departing, students walking in a hallway, lockers slamming, and action taking place during a school game. Each selection should be no longer than 30 seconds and students would receive no credit if the selection is over or under modulated.



Academic Content Standards

National

Understand the principles, processes, and products associated with arts and communication media (McREL, Standard 1, Arts & Communication Career)

National Benchmark

Know skills used in electronic communications (e.g., producing audio recordings and broadcasts, producing video recordings and motion pictures). (McREL, Arts & Communication Career, Grades 9-12)



Industry Standards and Expectations

Apply knowledge of audio equipment for productions, including basic recording equipment, equalizers, mixing consoles, and quality-monitoring equipment. (Performance Element, Pathway KS Statement: Apply Knowledge of equipment and skills related to audio production, States' Career Clusters, National Association of State Directors of Career Technical Education Consortium)

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