

Learning Begins with Hearing



Classroom Audio Solutions

What are Audio Solutions?

- Audio Solutions is the installation of an easy-to-use microphone system in a learning environment to distribute the teacher's natural, soothing voice throughout the room, so that every student can hear better, and thus perform better!
- Audio Solutions has far reaching effects including **higher test scores**, **increased retention of information**, **fewer behavioral issues**, **decreased teacher absenteeism**, and much, much more!

Amplification vs. Enhancement & Distribution

- **Traditional Amplification System**

Amplifies and makes the voice or presentation louder but not necessarily clearer or more understandable



- **Audio Solutions**

Distributes the teachers **natural, soothing voice** evenly throughout the listening environment

Voice is clear and understandable regardless of distance from speaker (so the teacher is free to move around the room)

Current Classrooms

- Classrooms are noisy!
- Sneezing, coughing, shuffling papers and backpacks, hall traffic, open windows, airplanes, busy roads, construction, heaters, fans, humming lights, miscellaneous electronics, tile floors, etc.
- Up to 1/3 of kindergarten and first grade children who have not been diagnosed with hearing disorders do not hear normally on any given day. This is due to seasonal sickness such as ear infections due to the common cold, flu, or allergies.
- There are approximately 50 million school children in the U.S. Over 8 million of them have some type and degree of permanent hearing loss.



Signal to Noise Ratio

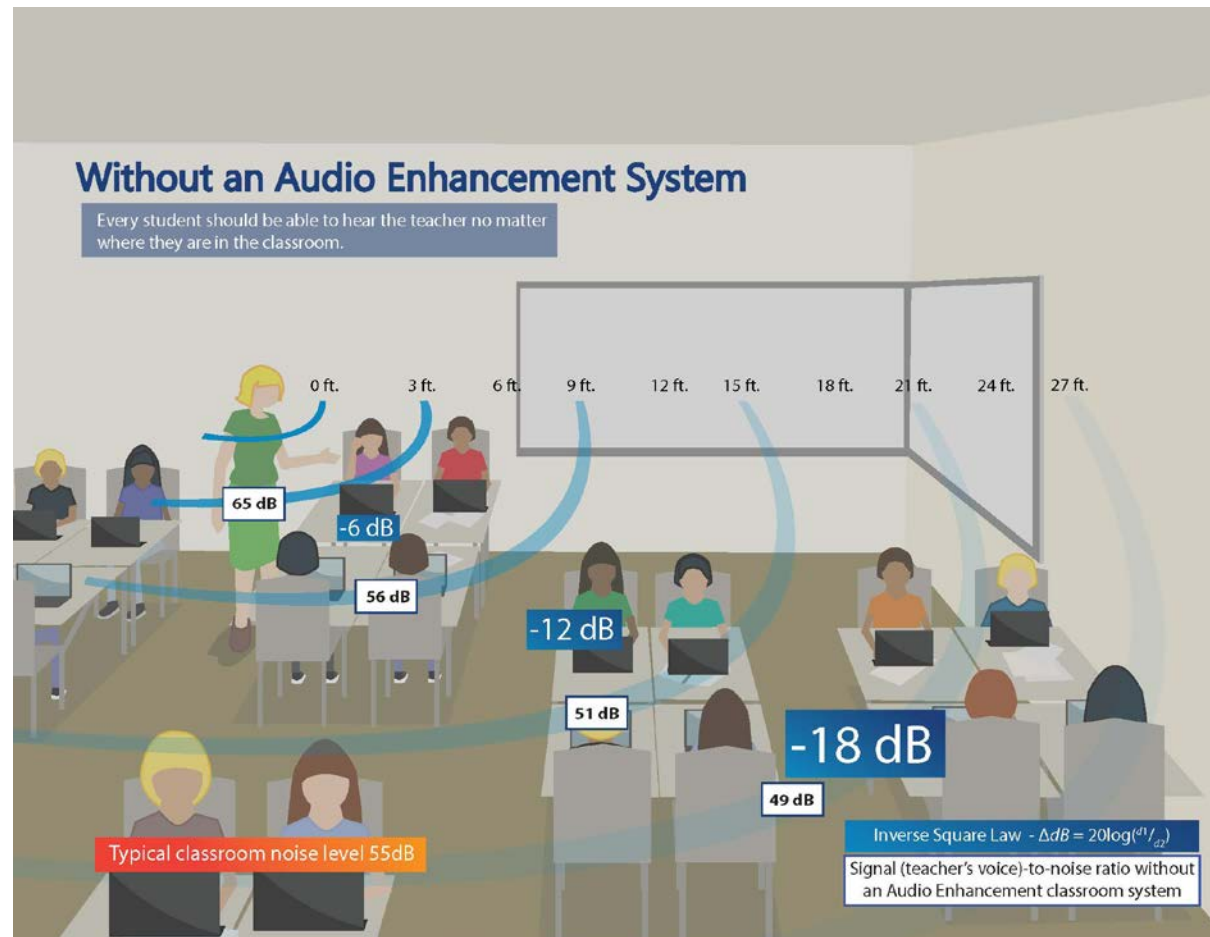
SNR or S/N Ratio: how much louder the signal (teacher's voice) is above the noise level in the classroom.

- S/N Ratio is a critical component in the student's ability to understand what is heard.
- Studies have shown that **Students need +15dB S/N Ratio.**

Inverse Square Law

Distance Matters: $\Delta dB = 20\log\left(\frac{d_1}{d_2}\right)$

Sound **DECREASES** 6 dB every time the distance is doubled

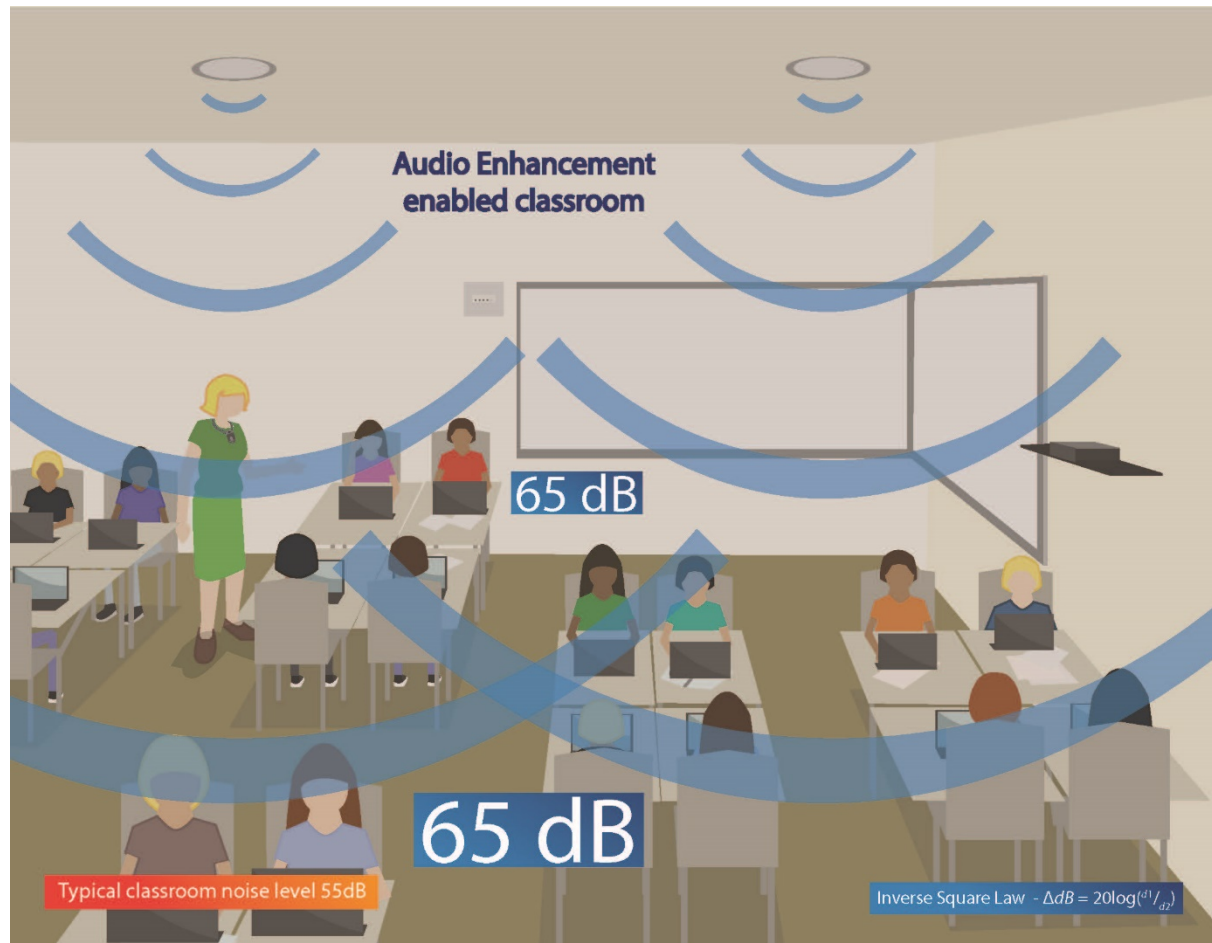


The **Inverse Square Law** states that as the distance doubles, the dispersing of a single source spreads over four times the area becoming only $\frac{1}{4}$ of its intensity. Just as you would not use one light bulb to illuminate a classroom, a teacher or student's voice is not a sufficient source of sound.

Inverse Square Law

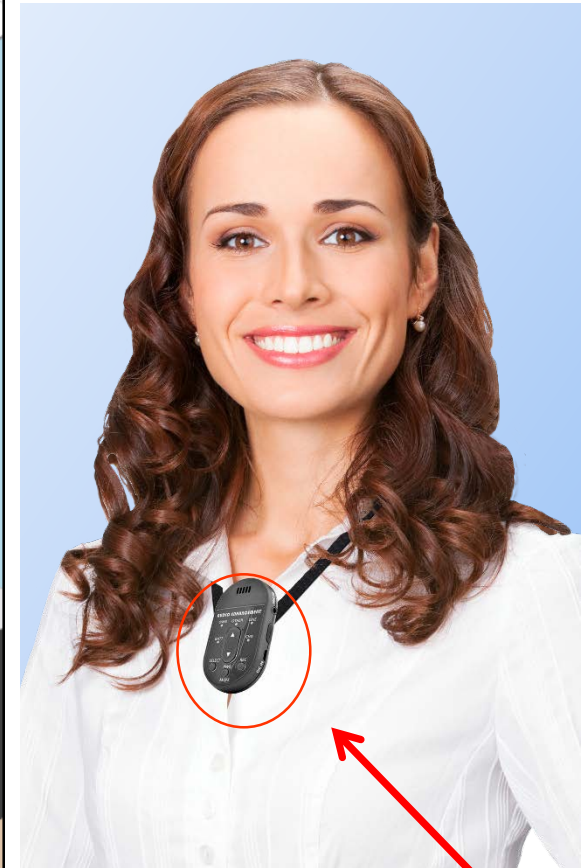
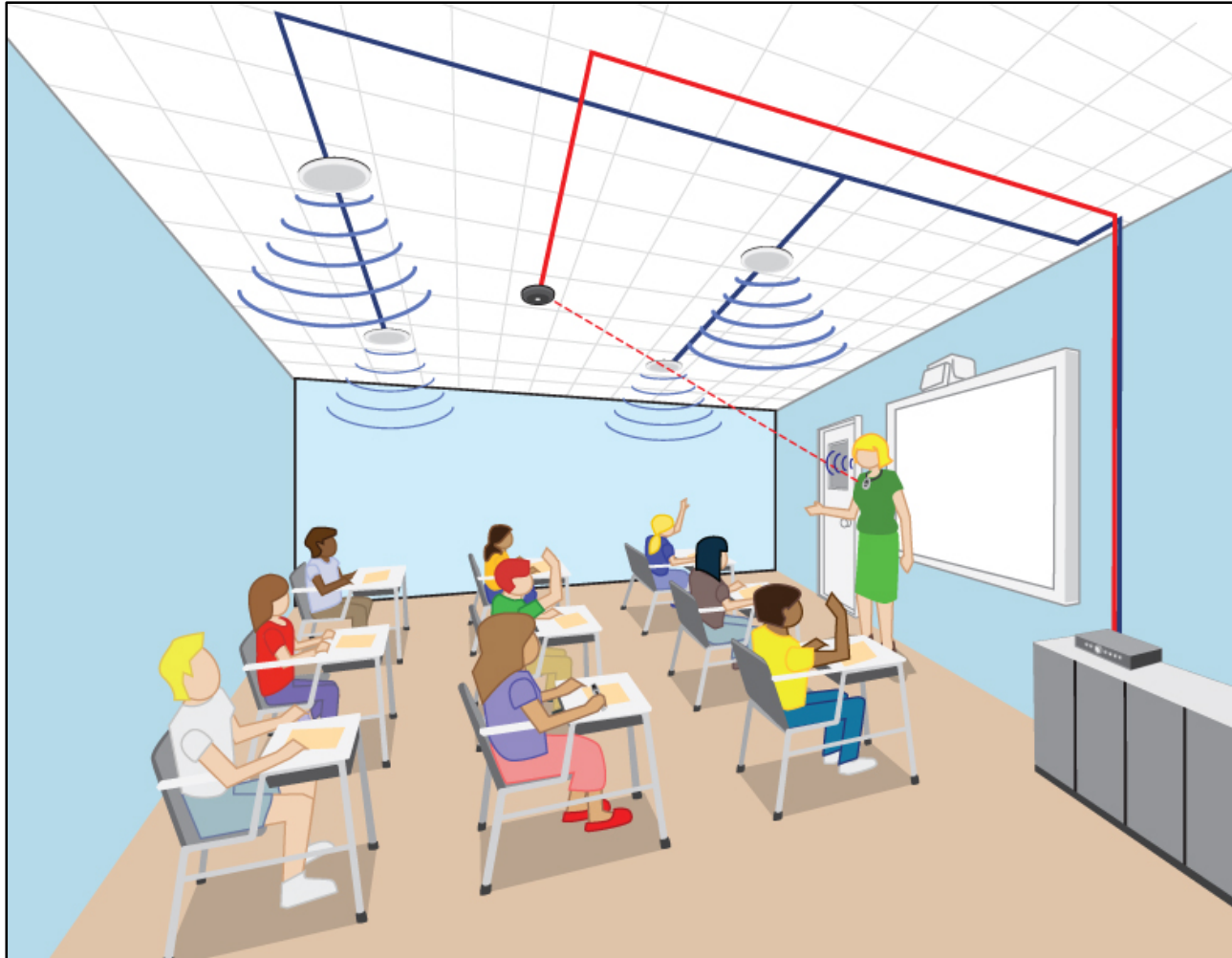
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Since 60-70% of all learning is auditory, the need for audio enhancement in the classroom is imperative to raise test scores and increase academic achievement.

How Does it Work?



Hearing

- Hearing is a first-order event for the development of language and literacy skills.
- Classrooms are auditory-verbal environments.
- The ability to learn centers on how well the brain receives incoming signals or information from the teacher.



What Part of the Vocabulary Carries Meaning in the English Language?

Can't teachers
just speak up?
or
use their
"TEACHER VOICES"?

When someone speaks loudly, vowel energy is increased, but consonant energy is not increased to the same degree. Thus, ironically, loud speech or yelling increases audibility, but it *decreases intelligibility*.



Automatic Auditory Cognitive Closure: an example from reading

Adults can automatically fill in the gaps
in speech and hearing

'Accodrning to a rscheearch at an Elingsh uinervtisy,
it deosn't mtt aer in waht oredr the ltteers in a wrod
are, the olny iprmoetnt tihng is taht frist and lsat
ltteer is at the rghit pclae. The rset can be a toatl
msee and you can sitll raed it wouthit porbelm. Tihs
is bcuseae we do not raed ervey lteter by it slef but
the wrod as a wlohe.' - Ceehiro

Automatic Auditory Cognitive Closure

- Better to be safe than
 - Don't bite the hand that
 - You can't teach an old dog new
 - A penny saved is
 - Children should be seen and not
 - If at first you don't succeed
- Punch a 5th Grader
 - Looks Dirty
 - Math
 - Not Much
 - Spanked or Grounded
 - Get new Batteries

Teacher Voice Fatigue

Hoarse teachers find talking is an occupational hazard

Updated 9/23/2011 8:33:17 AM ET 2011-09-23T12:33:17

- Theresa Simon's voice starting to go by the end of her first day.
- Simon use to suffer every fall after heading back into the classroom, along with several other teachers.
- By the end of the first week each year, Simon would lose her voice simply by usage.
- Simon is a 23-year veteran who teaches 7th and 8th graders
- ***"The acoustics in the classrooms are not that good and when you've got a class of 30 kids, you've got to reach the ones in the back."***
- Speech experts see an influx of scratchy-voiced teachers seeking help every autumn.
- Teachers make up about 16% of the 37 million people in the United States who are dubbed "occupational voice users."
- On average, teachers are more than twice as likely as non-teachers to have voice problems and about three times more likely to see a doctor about the issue.



Educator Vocal Strain & Fatigue

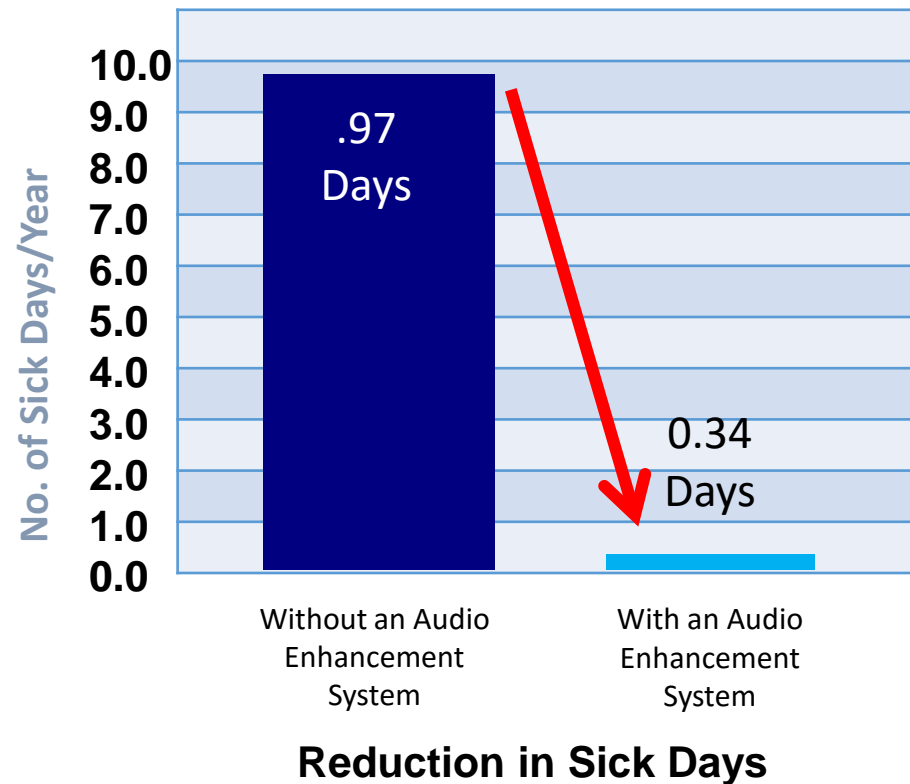
- **On average, teachers talk for 6.3 hours per day.** Karen L. Anderson, 2001
- Over 3M teachers in the US. Source: U.S. Bureau of Labor Statistics <http://www.bls.gov/ooh/a-z-index.htm#T>
- 18-20% of teachers reported voice problems caused 1 day to 1 week absence during a one year period. Roy, Merrill, Thibeault, Gray, & Smith, 2004; *Vocal Fatigue Among Teachers Gotaas C, Starr CD Folia Phoniatr 1993; 45: 120–129*
- 21% of teachers had a pathological voice condition (75% could be prevented) Urrutikoetxea, Ispizua, & Matellanes, 1995
- Because of voice problems, 4.2% considered a job change. Mattiske et al., 1998
- One in two female teachers reported voice disorders (50.0%) compared to one in four males (26.0%). Vercambre et al, *BMC Public Health* 2009
- The voice problems of teachers in the US cost a staggering \$2.5 billion annually. Verdolini and Ramig, 2001



Dubuque Iowa

Study on Teacher Absenteeism

56% of 141 teachers reported suffering from vocal abuse/fatigue problems at least once during the school year (1994-1995).



At the time, the school system was paying \$62 per day to substitutes, and they concluded that **every 8 to 10 sick days saved by the district would cover the cost of another classroom amplification system.**

English Language Learners (ELL)

- From the May 2010 Title III Report
 - 44% of 4th grade ELL students scored below basic (lowest level) in mathematics and 70% scored below basic in reading.
 - 69% of 8th grade ELL students scored below basic mathematics, 70% in reading
- Projections (Source: *English Language Learners: Incorporating Technology into the Academic Achievement Strategy* White Paper. Association of Latino Administrators & Superintendents, 2011)
 - Over the past 15 years the number of ELL students has doubled.
 - By 2025, one out of every 4 public school students will be an ELL
- *Effects of Sound-field FM Amplification on the Speech Perception of ESL Children*, by Carl C. Crandell, Ph.D., showed that ELL students “exhibit greater speech-perception difficulties than native English speaking children, particularly in degraded listening environments”.
 - His research showed that speech perception abilities of ESL children were **significantly improved with the utilization... of sound enhancement systems** that amplify the speaker’s voice, whether teacher... parent or fellow learner.

Demand for Audio Enhancement:

- 60-70% of all learning is auditory*
- On average, teachers talk for 6.5 hours per day
- The State of Ohio has **MANDATED** through the OSFC (Ohio School Facilities Commission) sound enhancement in all newly constructed K-12 classrooms
- Of the 50 largest districts in the U.S. – Approximately 40 have standardized on IR Microphones



*Carol Flexer, University of Akron, 2002

Benefits for...

ADMINISTRATORS

- ❖ Literacy and math gains
- ❖ 5th Grade SAT student gains
- ❖ State criterion reference test gains
- ❖ Teacher absenteeism declines
- ❖ Substantial financial savings in substitute teacher pay & uninterrupted student learning

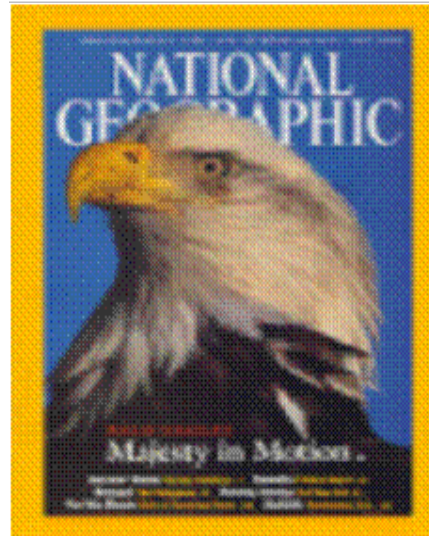
TEACHERS

- ❖ Easy to use and teacher friendly
- ❖ Less vocal strain and fatigue
- ❖ Don't have to repeat instructions
- ❖ Teacher can speak in nurturing tones
- ❖ Teacher can be heard over disturbances
- ❖ Spend more time teaching and less time on management of students
- ❖ Improved Student Performance

STUDENTS

- ❖ Students are more engaged in the learning process
- ❖ One-on-one instruction, no matter where you are in the classroom
- ❖ Students can hear the teacher better
- ❖ Improved Spelling Performance
- ❖ Students are more attentive – less disruptive
- ❖ Teachers don't sound like they are yelling to be heard

Wireless IR microphones -- Getting National Exposure





everychild.one voice.

In June 2007, the national PTA organization **adopted the Classroom Auditory Learning Issues resolution**, making education on these auditory issues and **advocacy for sound enhancement a national priority.**

Teacher Pendant Microphone

Remote Volume Control

OWN, OTHER, LINE – Indicates which source will be controlled by the Up/Down remote volume controls

Auxiliary Line Level Input Connector Wirelessly transmits audio

BATT – Battery and Power Status Indicator (Green when on and fully charged)

SELECT – Selects which source (OWN, OTHER, or LINE) will be controlled by the Up/Down remote volume controls



Up/Down Remote Volume Controls

External Microphone Input Connector

CHG – Battery Charging Status Indicator

Standard Micro USB Charging Port

Special Function Control

PWR – Power On/Off and Mute Control

Buttons used for pairing microphone to receiver

Audio Solutions System Features

- **Intelligent Battery Charger**
 - Microprocessor Controlled Battery Charger
- **Microprocessor controlled charging completely manages the charging and discharging of the battery, providing lower total cost of ownership by maximizing battery life.**
 - Constantly monitors the discharge cycle and prevents the battery from being discharged too far
 - Carefully monitors the charging cycle, only charging the battery to the optimum point and then switching to a maintenance charge mode.
 - Monitors the type of battery installed. Unlike the 'smart chargers' offered by other manufacturers that only work if you use a special battery with part of the label stripped off, the Intelligent Charger from Audio Enhancement actually analyzes the type of battery that is installed and will only charge the proper type of battery.
- **Auto Charge Detect**
 - The microphone will automatically detect when the charger is plugged in, then will turn off and enter the charge mode



Handheld Student Pass-around Microphone

Auxiliary Line Level Input
Connector to wirelessly
transmit audio

Standard Micro USB
Charging Port

Anti-Roll Design

Buttons used for pairing
microphone to receiver

CHG – Battery Charging
Status Indicator

BATT – Battery and Power
Status Indicator (Green when
on and fully charged)

Push-to-Talk Functionality

Power On/Off switch

Some teachers say this is the best
reading tool in the classroom!

Audio Solutions Features

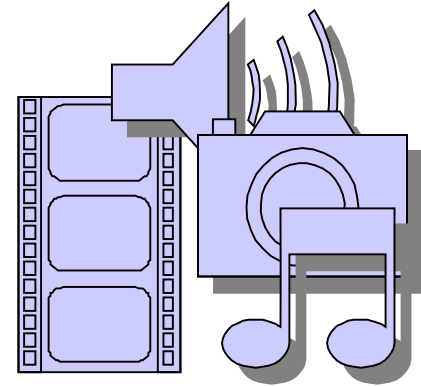
Microphone Auxiliary Input

- Allows local playback from additional sources (MP3, CD, computer, etc.)
- Inputs on both the teardrop and the handheld microphones



Audio Solutions Features

Digital Audio Recordings:



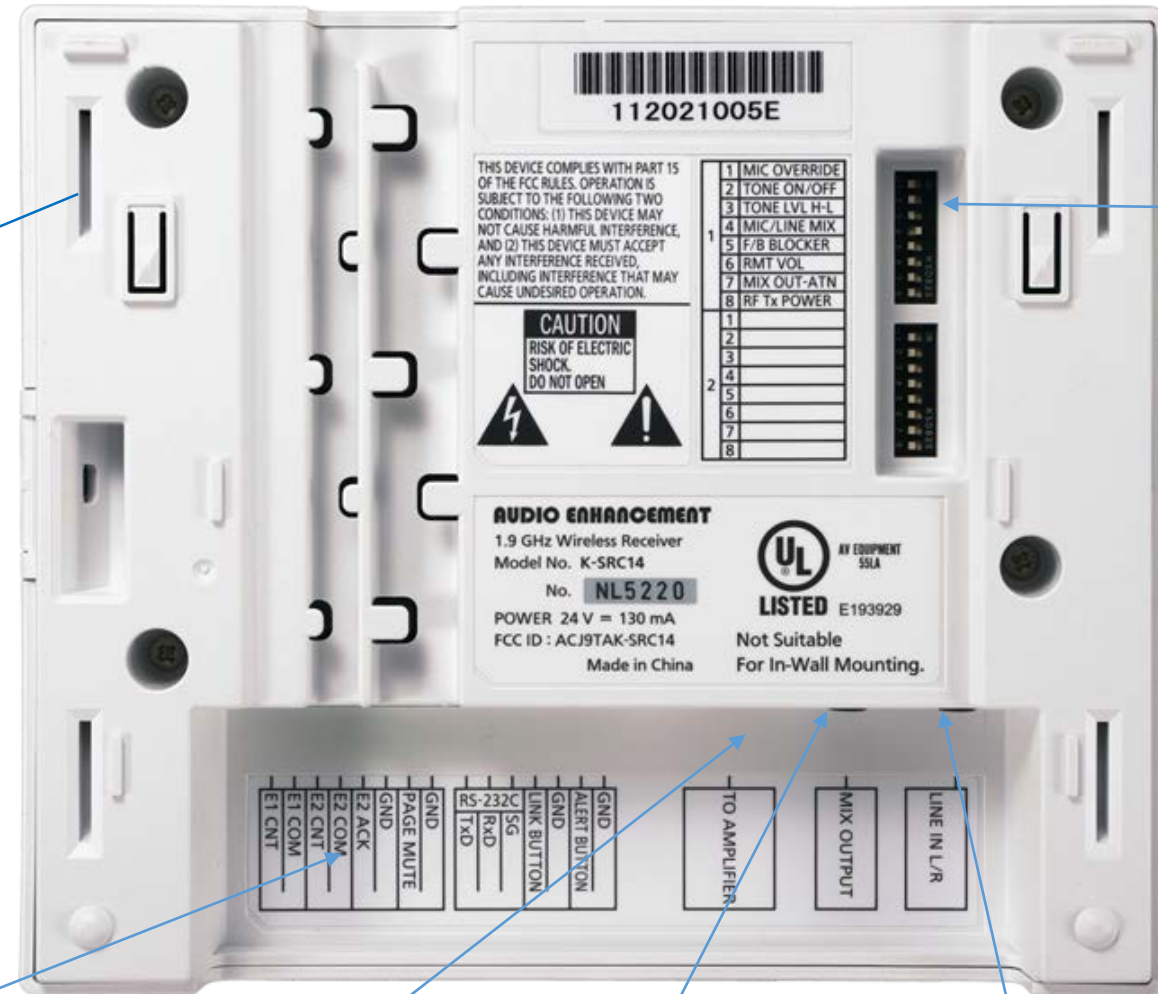
- The Audio Solutions, along with the teacher's computer, is ready to capture *digital audio recordings*. Audio from the teacher's and students' microphones, along with multimedia audio, can be easily recorded to the computer by utilizing the line output on the back of the amplifier.
- Use with your favorite Interactive White Board or other 'pod-casting' software
- This is what they mean when they say "21st Century Classroom"

Dual Channel Receiver

xD
TECHNOLOGY

Easy Mounting/
Installation

DIP Switches



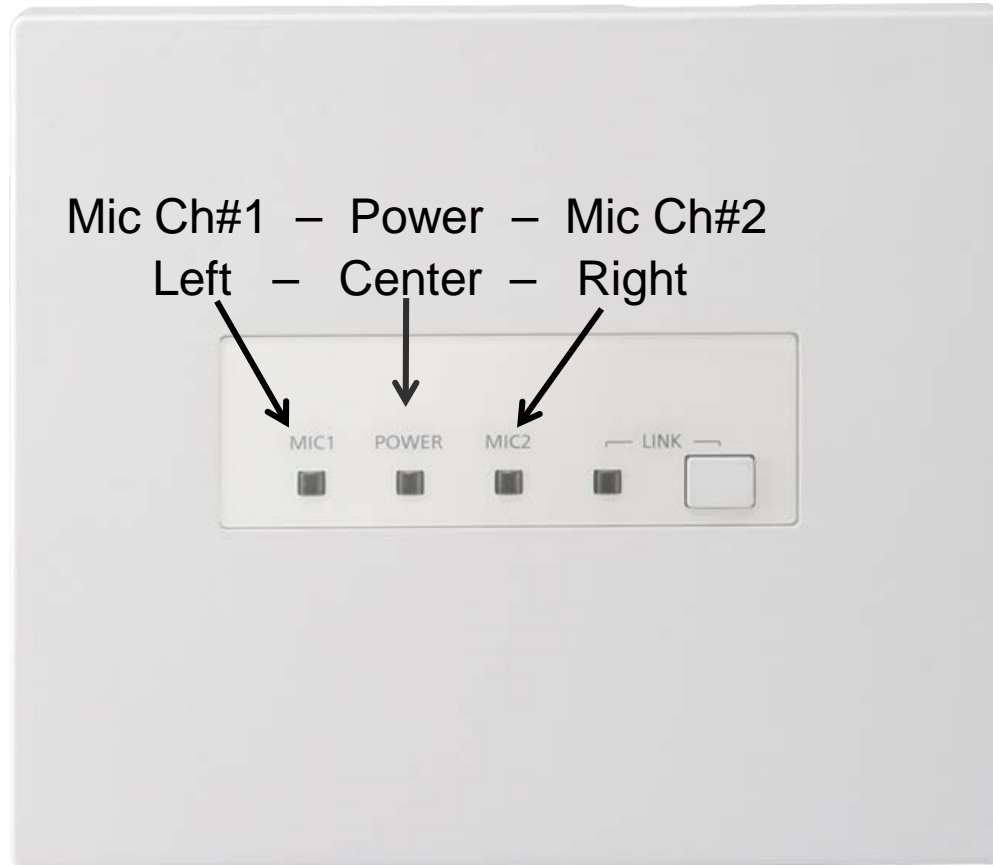
Control Terminals (SAFE, Page Mute and RS-232/ Serial Connections)

Connection to Room Amplifier

Mixed Line Output

Aux Line Input

LED “Status-at-a-glance” Indicators



Mic Ch#1 LED is orange when feedback blocker is activated



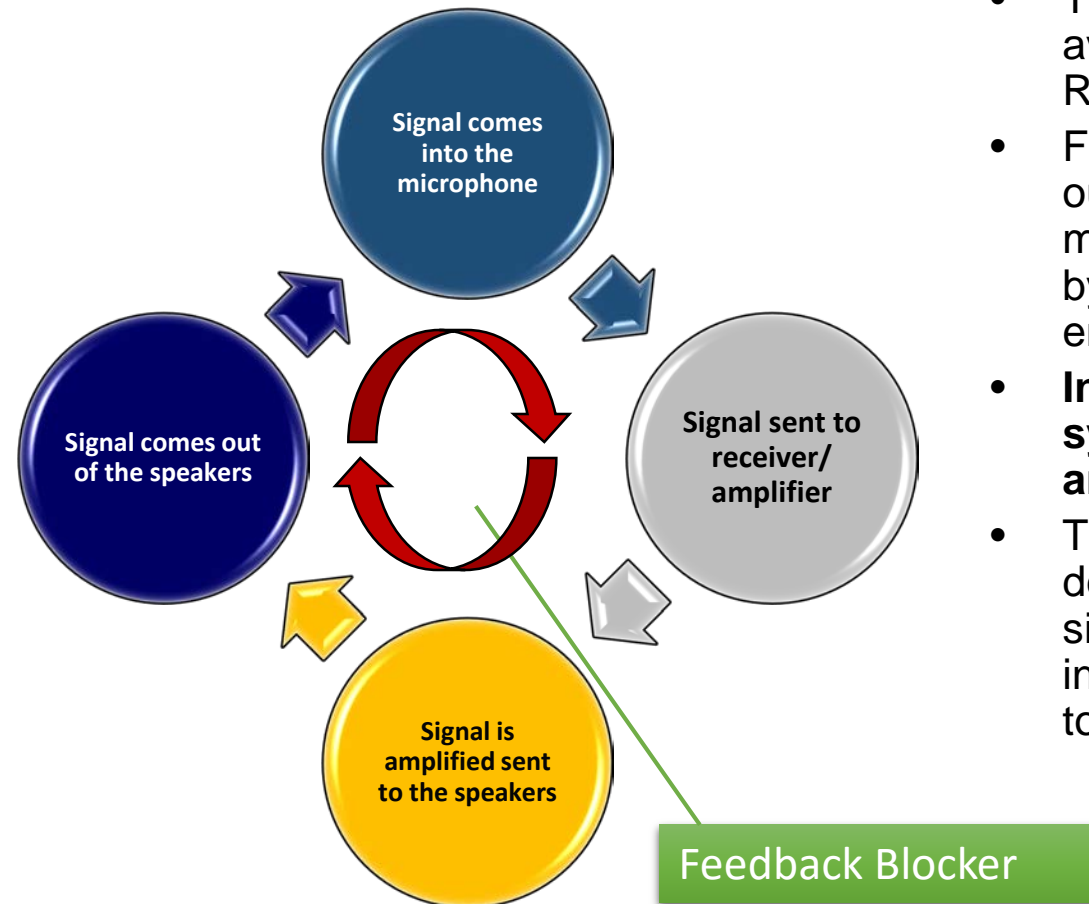
The Receiver

FEATURES & BENEFITS

- Upgrade or add to your existing FM classroom
- Connect to any audio, any brand
- Remote control access on microphone
- Feedback blocker
- Better frequency response
- Greater coverage area
- Easy to install



Advanced Feedback Blocker



- The Advanced Feedback Blocker available on the IR-Satellite and XD Receiver
- Feedback occurs when audio comes out of the speakers, back into the microphone, and is then re-amplified by the system – this continues in an endless loop, creating feedback
- **In a classroom audio enhancement system that is properly installed and setup, feedback is not an issue**
- The advanced feedback blocker is designed to help assist in those situations where a user may inadvertently turn the audio system up too loud

Advanced Feedback Blocker

3 Modes of Operation

– Selective Filters Mode

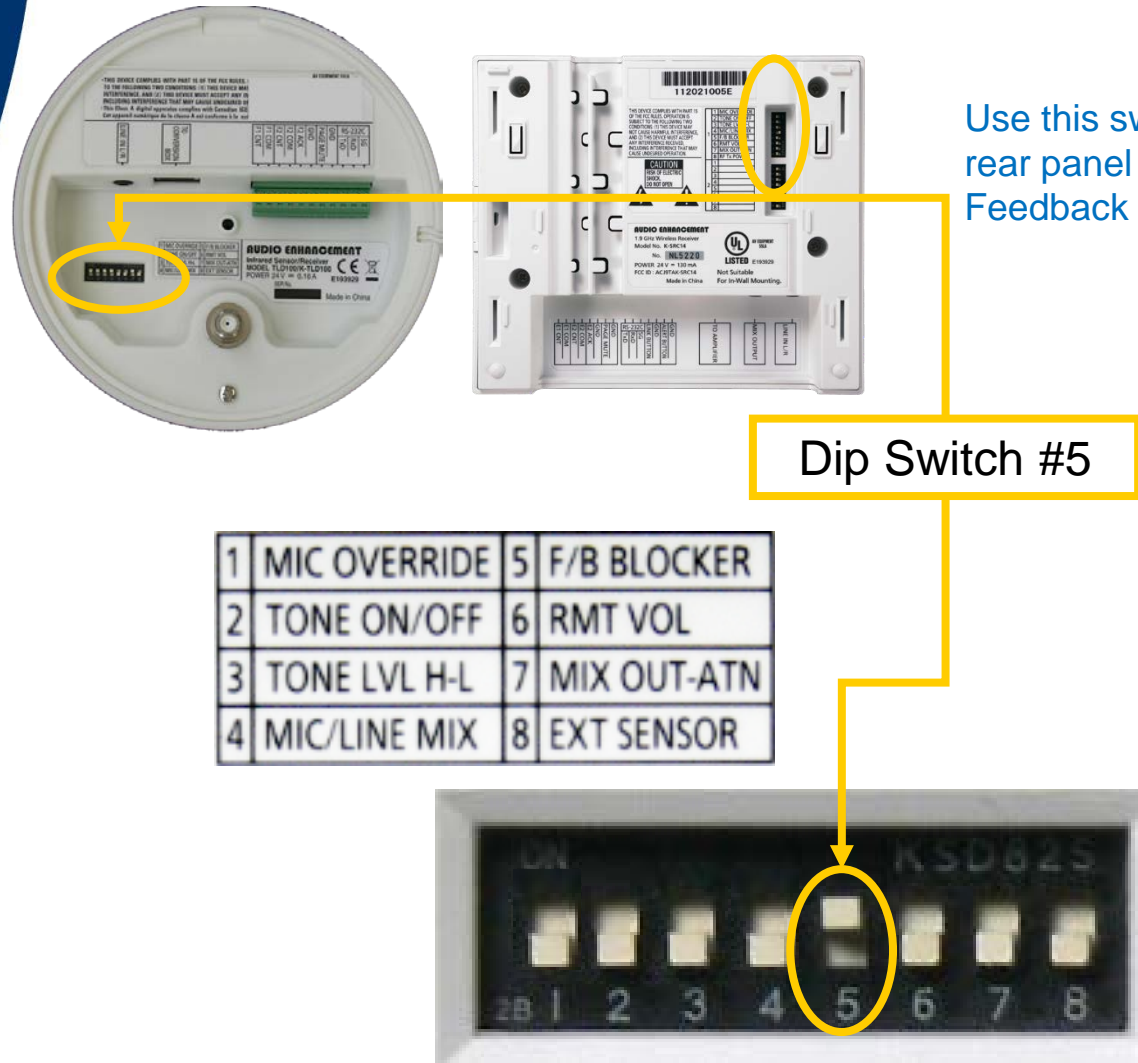
- The processor constantly monitors the audio signal through the system
- When it finds one particular frequency that is 'ringing' it will attempt to reduce the level of that frequency.
- It can simultaneously monitor up to 3 frequencies
- It can also apply either a high pass or low pass filter to try and eliminate the feedback

– Attenuation Mode

- Used in addition to the filters
- If the processor continues to sense 'ringing' in the system, it will lower the overall level of the system by 6 dB

– Mute Mode

- If the above steps fail to eliminate the feedback situation
- The processor will mute the system
- The processor also activates the yellow feedback blocker indicator on the front of the amplifier
- This is an indication that the system volume level is significantly too high



The Sentinel System

The Sentinel System is an affordable option that provides the latest in classroom security! The Sentinel System is designed specifically to provide classrooms with quality audio, plus the added features of the **SAFE SYSTEM™** without breaking the budget.

The Sentinel System main components include the IR-Satellite, CA-50A amplifier, and teardrop microphone.



Sentinel System CA-50A Amplifier

The CA-50A classroom amplifier provides quality audio for teachers, students, and multimedia sources. It's compact design is ideal for small spaces and is an affordable option to fit any budget.

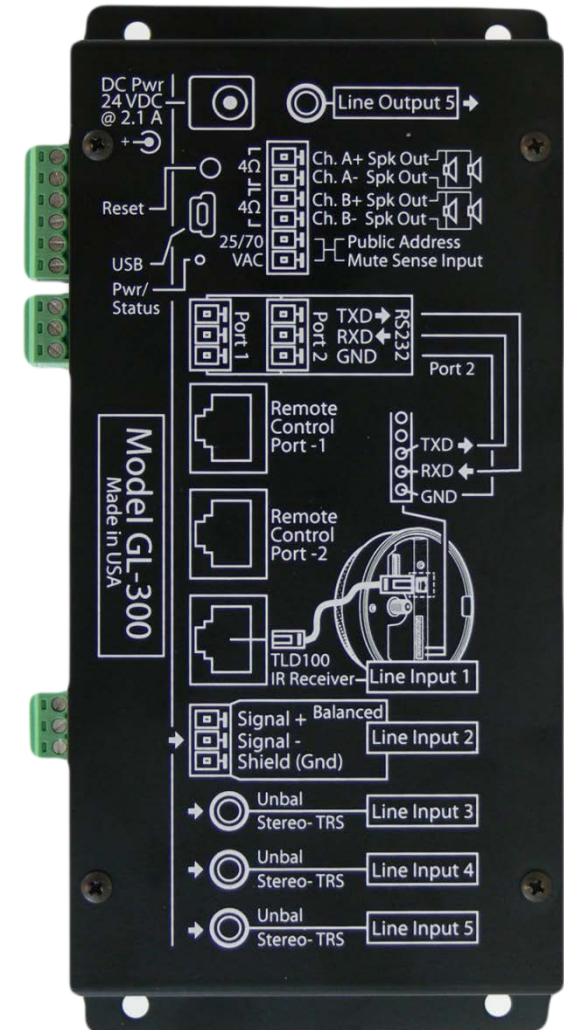
Features:

- Simple and affordable quality audio
- Directly connect the IR-Satellite (TLD100) connector (RJ45) to the CA-50A amp, no need for adapters.
- 32 Watts of power (2-16 Watt Amps)
- 3-Band Equalization
- Three variable gain line inputs
- Slim design and efficient heat dissipation allows for easy mounting in a variety of applications including:
 - Media carts
 - Behind interactive whiteboards
 - Inside cabinetry
 - Up in the ceiling



GL-300 Classroom System

- Controllable via RS-232
 - (2) RS-232 Communication Ports: 1 port for integration with control systems or IR-Satellite
 - (2) Remote Control Ports: 2 ports for integration with wall plate controls, includes RS-485 control
- 4 multimedia inputs
 - 1 Line balanced/unbalanced input (Euroblock),
 - 3 Line unbalanced stereo inputs (3.5 mm)
- 1 Input connector for IR-Satellite/TLD100 (RJ45)
- Microphones will mute during paging
- USB programmable
- 5-Band Equalizer
- Very compact design



SoloSolution – Portable Solution

- Provides complete system in a small, compact enclosure
- Ported enclosure for superior full frequency sound reproduction
- Remote control of microphone levels, and multimedia levels
- 2 Auxiliary Inputs, 1 Auxiliary Output
- Easy to access front panel controls
- Flexible IR Sensor mounting
- Can be mounted on top of the unit or remotely
- Can be taken anywhere
- Great option when installation is not possible



MS-450: Classroom Audio Solutions, Multimedia Amplifier & Control Appliance

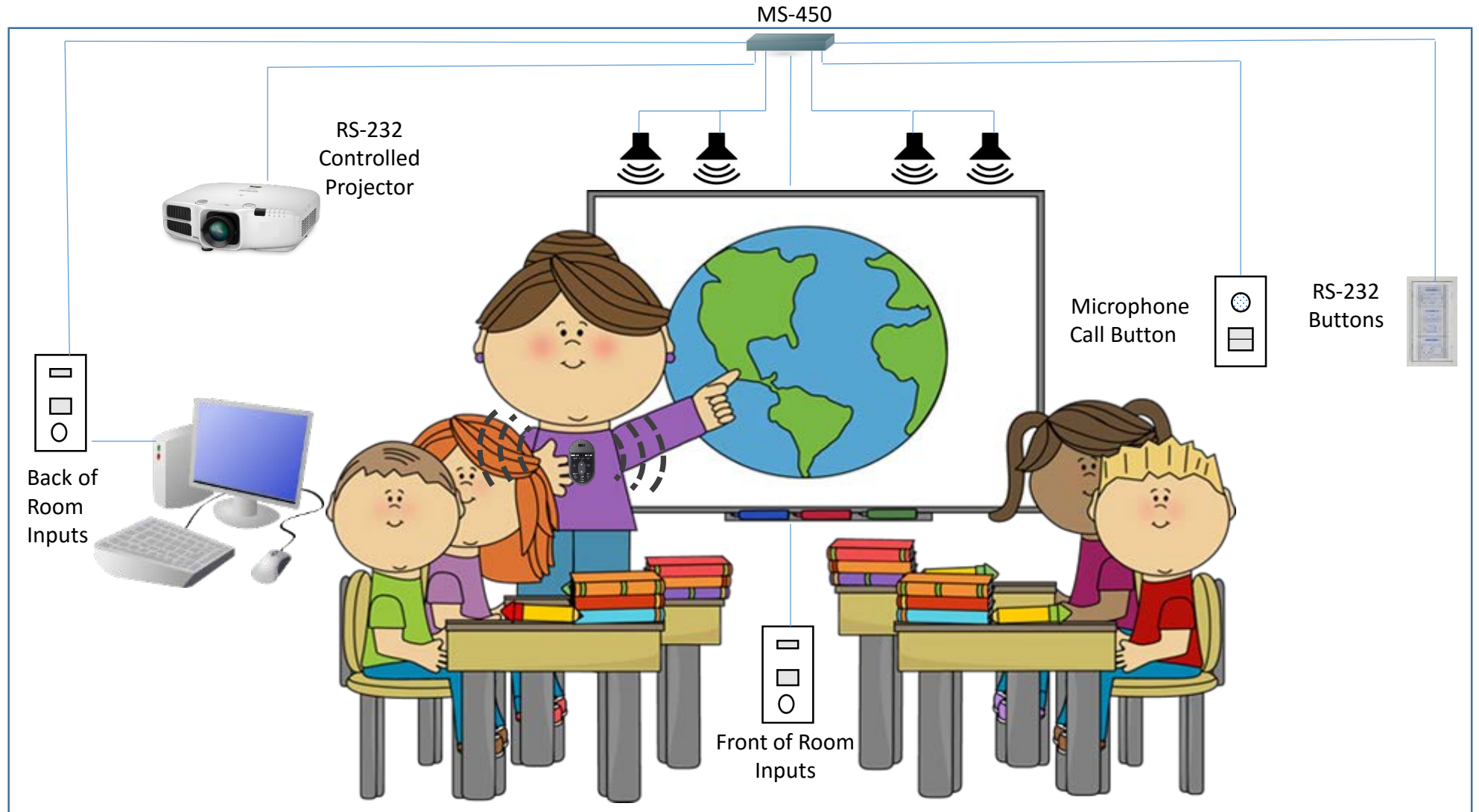
- RS-232 Control Device
- 2 Built in Digital I/O's
- 1 Line Balanced/Unbalanced Input
- 3 Line Unbalance Stereo Inputs
- Audio Enhancement TLD100 Input
- Full Duplex Hands Free Communication
- VoIP, RTP, & Multicast Protocols
- Network Web Based Control
- Integrated with Bell System
- Integrated with PA System
- Local Audio Mute During PA
- Integrated with Phone System
- Integrated with Alert Button
- *Optional Wall Mount Call Button and Microphone*
- *Optional RS-232 Button Control*

Classroom Uses:

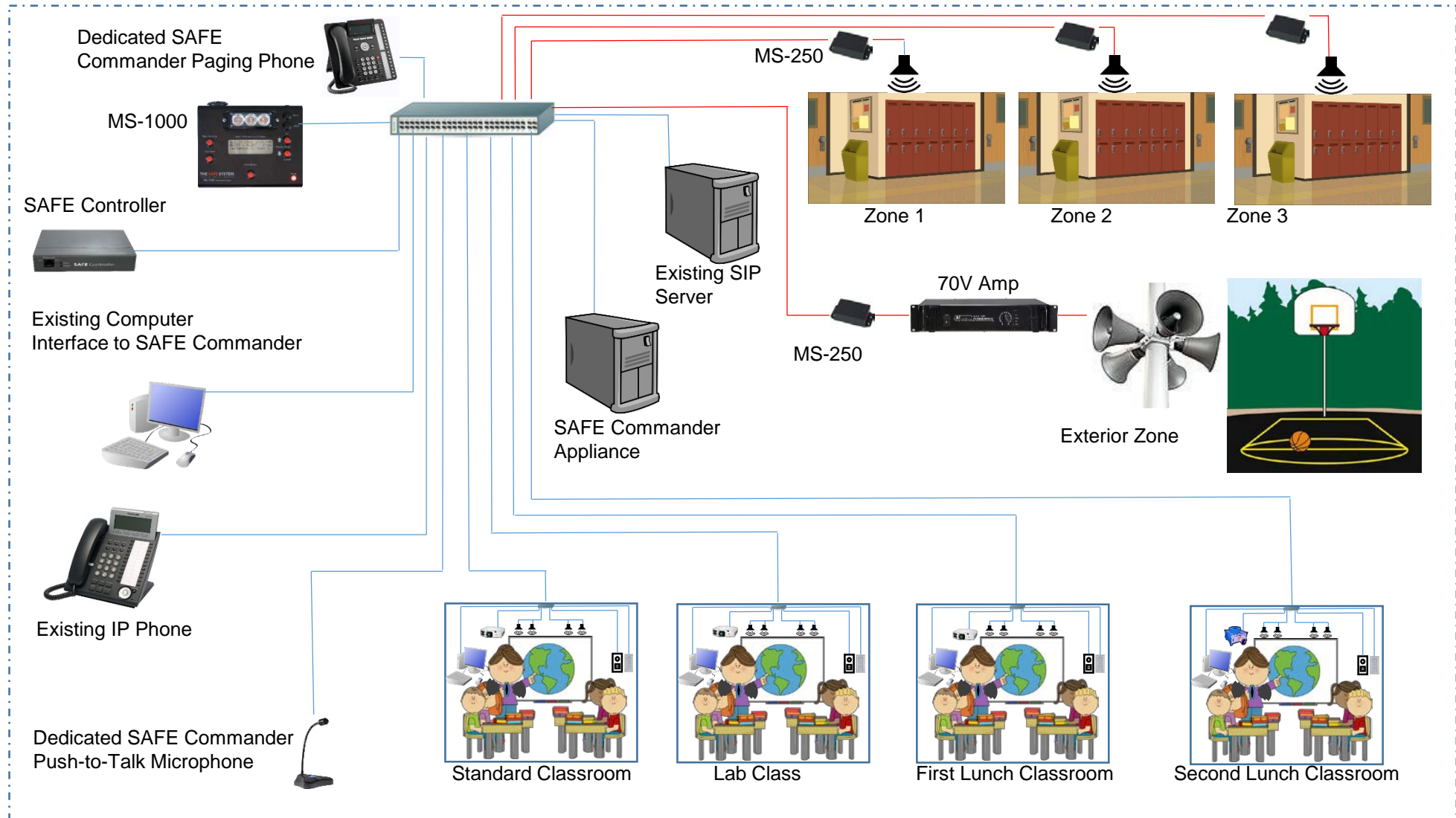
- Amplification
- SAFE System Interface
- Multimedia Audio
- Network Bells, PA, & Intercom Interface
- A/V Control Interface



MS-450 Total Classroom Audio Solution



MS-450 Integration with Bells, PA & Intercom



What Schools are Saying about Audio Enhancement's Audio Solutions

**Comments from Administrators
Teachers, and Students**



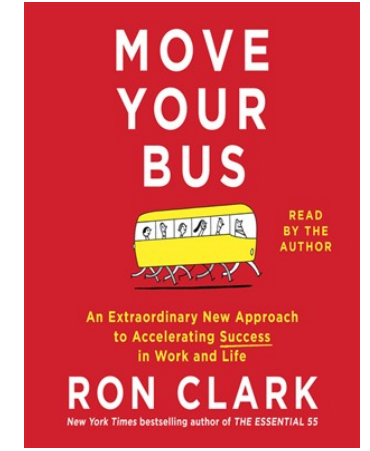
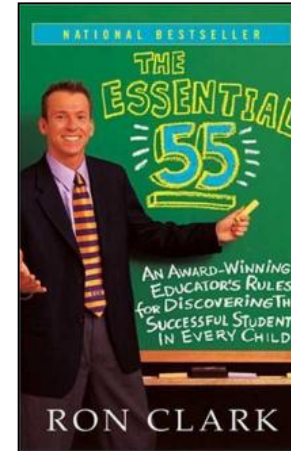
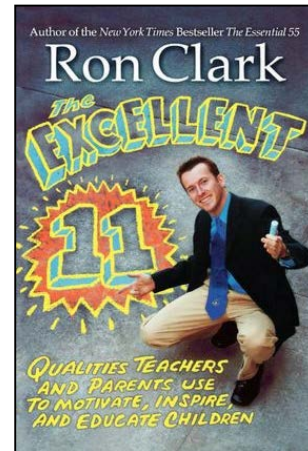
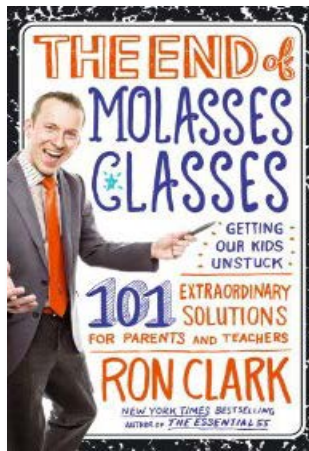
Ron Clark

Disney's Teacher of the year 2001 & Founder of the Ron Clark Academy in Atlanta, Georgia.



"If you really want to level the playing field then Classroom Audio is a necessity for every classroom..."

– Ron Clark





Newton County Schools, GA took us
on a journey to enhance learning,
using VIEWPath.

This is their story.

www.AudioEnhancement.com • 800.383.9362

[Click to Play](#)

What Administrators are Saying

“The students are less distracted & more attentive.”

“If children don’t hear clearly and consistently, their academic potential is compromised.”

“The only downside I see is that I can’t get these systems into my classrooms fast enough.”

“There is a much greater understanding of oral instruction.”

“This is the single best way I’ve found to increase test scores across the board.”

“If a child cannot clearly hear the teacher, the entire educational system is undermined.”

“In working with school districts across the United States, I have observed that the primary factor in improving student learning is keeping the students engaged in the learning process. Both teacher and student must be actively engaged for maximum learning to occur. I would recommend Audio Enhancement to any school as a way to increase the amount of engaged time.”

Robert N. Fortenberry – Former Superintendent, Jackson, MI



What Teachers are Saying

“I have more energy throughout the day.”

“My students are more attentive and less disruptive.”

“I don’t have to repeat instructions.”

“I have noticed significantly improved student performance.”

“You can take away my desks and manuals, but I’ll bar the door if you take away my amplification equipment!” - Louise Ortberg, Fulton School Teacher

“After having IR in my classroom, I cannot imagine ever teaching without it again. The system ensures that every child in my classroom hears and clearly understands everything that is said, thus significantly increasing student engagement. As a language arts teacher, I am continuously trying to teach my students the importance of inflection, articulation, and subtle changes in one’s voice when communicating. With IR this becomes possible -- I am able to talk to every child in even the faintest of whispers if I wish.”

**Kimberly Bearden, Cofounder and Executive Director
The Ron Clark Academy, Atlanta, GA**



What Students are Saying

“The teacher doesn’t yell at us anymore.”

“I can hear the teacher better.”

“It makes class more interesting.”



“I like it because it feels like the teacher is right at my side, talking just to me!”

