HARMAN

ACTIVE LEARNING CLASSROOMS

Audio Visual System Solutions for Education

AKG · AMX · BSS · crown · dbx · DigiTech · JBL PROFESSIONAL · lexicon · Martin · Soundcraft · STUDER

ACTIVE LEARNING CLASSROOMS

Active learning is an instructional method in which students engage in a variety of activities to learn their study material, including reading, writing, talking, listening and reflecting. It is a group-based, interactive learning style that is centered on problem solving and learning by doing. As part of a growing educational trend, active learning flips traditional lecturing in class from passively listening and taking notes to watching lecture videos online and coming to class to collaborate and study in groups. In the classroom, desks are shifting from traditional static rows to movable clusters. Active learning classrooms are becoming more popular in higher education, with a growing demand for the adoption of this type of classroom. To keep up with the trends, traditional classrooms have to be remodeled into dynamic, technology-rich project rooms. Active learning classrooms have to be flexible and inspire collaboration. After all, the goal is to create a positive learning experience!

COMMON ACTIVITIES

- Learning and collaborating dynamically: as a whole class, in small groups or individually
- Transmitting multimedia content from a variety of devices to one display or multiple displays
- Connecting laptop computers to local displays on or near student tables
- Recording lectures from the teacher's desk for online learning
- Controlling AV equipment at each individual student table, teacher's desk and the whole room
- Using a wireless microphone for teacher lectures and wired microphones for student presentations
- Sharing lecture notes and presentation files with students
- Receiving support from an AV help desk with real-time equipment monitoring

HARMAN HAS A DIVERSE PORTFOLIO OF AV TECHNOLOGY FOR ACTIVE LEARNING CLASSROOMS

HARMAN is the leading manufacturer of professional audio, video and control technology found in modern active learning classrooms. Our technology seamlessly combines different systems under one platform that can be centrally managed to ensure the best functionality. These comprehensive systems improve the quality of information delivery, promote collaboration and lead to more effective learning.

Sound Reinforcement

Room Scheduling & AV Asset Management

Collaboration & Conferencing

AV Control & Automation

TYPES OF AV SYSTEMS OUR TECHNOLOGY CAN BUILD

- AV Control & Automation Systems for the Teacher's Desk & Student Tables
- Sound Reinforcement System
- Collaboration & Conferencing System
- Room Scheduling & AV Asset Management System

WHAT IS AN AV CONTROL & AUTOMATION SYSTEM?

AV control and automation systems simplify the selection and operation of AV equipment, so teachers and students feel comfortable operating the room's technology and confident that it supports both lectures and group interaction.

In an active learning classroom, the AV control and automation system performs two important roles:

1. Manages all sources of audio, video and computer devices in the room through a central interface (typically installed at the teacher's desk, called a master system), distributing content to multiple displays, controlled with a master user interface
2. Manages all audio-visual devices used at student tables (called a secondary system), distributing sources to a local display, controlled by a secondary user interface

THE CORE BUILDING BLOCKS OF AN AV CONTROL & AUTOMATION SYSTEM WITH AMX BY HARMAN

Modero® Touch Panel   Novara Keypad

THE USER INTERFACE

The User Interface (UI) is the remote control for the AV system. A UI can be as simple as a keypad to as sophisticated as a full-color touch panel. The purpose of the UI is to simplify the operation of the AV system with intuitive controls and automated functions (such as powering on/off several devices simultaneously or changing lighting presets). AMX by HARMAN offers a wide variety of UIs, including Modero® Touch Panels, Novara Keypads and Massio™ ControlPads.

HydraPort®

ARCHITECTURAL CONNECTIVITY

Bring your own device (BYOD) has become a standard practice throughout many schools. Connecting personal devices to a classroom AV system requires different types of AV cables. The AMX HydraPort® consolidates all of the cables and ports needed to connect to the AV system inside a sleek, surface-mounted enclosure. HydraPorts are customizable with swappable input modules, power outlets, keypads and retractable cables.
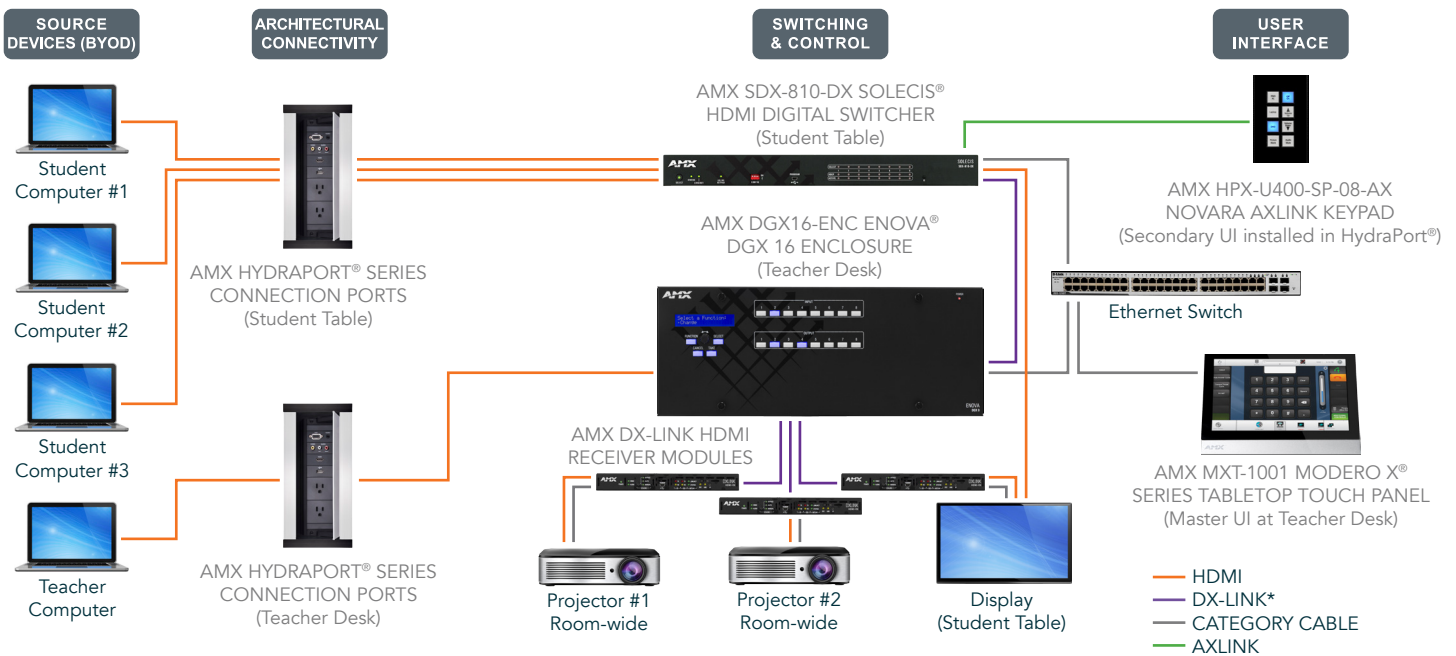

Enova DGX®

SWITCHING & CONTROL

The Audio Video Switcher and Master Controller are the central hub for AV devices used at both the teacher desk and student table. The AV Switcher brings in all audio and video sources, manages the signals, automatically scales the video to the optimum resolution and routes them to displays. The Master Controller is the brain of the system, which coordinates functionality with the user interface and communicates to other AV devices. The AMX Enova DGX® series of AV Enclosures combines the Master Controller, video scaling, microphone mixer and AV Switcher into one frame, making it the perfect core for an AV system in an active learning classroom.

TIPS FOR DESIGNING THE AV CONTROL & AUTOMATION SYSTEM

- Make a list of all the necessary source devices in the AV system, including each device's inputs and outputs for the classroom, the teacher's desk (main system) and each student table (secondary systems). This list defines the minimum size of the Audio Video Switcher and Master Controller needed for the main system to serve the room and the secondary systems needed to serve each table.
- Determine the functions users require to operate each source device in the room system and table systems. This determines the minimum number of buttons the master and secondary user interfaces require and the presets to program for each controller.
- Decide where users connect their devices to the switcher. Will it be a HydraPort® mounted into the desk or an AV plate in the wall? Consider the cable types needed for connecting devices, the length of these cables and any potential tripping hazards.
- Decide if you want to have the help desk accessible from the master user interface. Being able to call the help desk directly from the user interface alleviates users' fears if they need assistance while using the system.

For more resources on AV Control & Automation Systems, please visit www.amx.com/education.

AMX AV CONTROL & AUTOMATION SYSTEM CONCEPT FOR ACTIVE LEARNING CLASSROOMS

SOURCE DEVICES (BYOD)

Student Computer #1

Student Computer #2

Student Computer #3

Teacher Computer

ARCHITECTURAL CONNECTIVITY

AMX HYDRAPORT® SERIES CONNECTION PORTS (Student Table)

AMX HYDRAPORT® SERIES CONNECTION PORTS (Teacher Desk)

SWITCHING & CONTROL

AMX SDX-810-DX SOLECIS® HDMI DIGITAL SWITCHER (Student Table)

AMX DGX16-ENC ENOVA® DGX 16 ENCLOSURE (Teacher Desk)

AMX DX-LINK HDMI RECEIVER MODULES

Projector #1 Room-wide

Projector #2 Room-wide

Display (Student Table)

USER INTERFACE

AMX HPX-U400-SP-08-AX NOVARA AXLINK KEYPAD (Secondary UI installed in HydraPort®)

Ethernet Switch

AMX MXT-1001 MODERO X® SERIES TABLETOP TOUCH PANEL (Master UI at Teacher Desk)

— HDMI
— DX-LINK*
— CATEGORY CABLE
— AXLINK

*Download our whitepaper, "Cabling for Success with DXLink."

RAPID PROJECT MAKER HELPS YOU BUILD THE PERFECT AV CONTROL & AUTOMATION SYSTEM

RAPID PROJECT MAKER

Rapid Project Maker, or RPM, is a cloud-based software application that guides you through the process of selecting, configuring and connecting your devices, such as switchers, touch panels and displays. With RPM, you can program your AV controller and create an elegant user interface with no programming skills, and save hours of time versus traditional code-based programming. This software is free to our registered users.

To learn more about RPM, visit www.amxrpm.com.

WHAT IS SOUND REINFORCEMENT IN AN ACTIVE LEARNING CLASSROOM?

The Sound Reinforcement (or Public Address) system is a means to control the volume of speech or music and distribute the sound, so it can be heard intelligibly by the students. In an active learning classroom, this system can be simple or moderately complex, based on the need and/or the challenges presented by the room itself. What do the users really need?

THE INSTRUCTOR needs a hands-free wireless microphone to wear during class, so he or she can move about freely during a lecture and/or project work. Additionally, instructors need the ability to connect a laptop, video player or other device to share presentations or play multimedia and high-definition movies. It is important to consider a listening assist system for ADA compliance.

STUDENTS depend on the Sound Reinforcement system to hear their instructor, especially when seated at tables farther away. When the students are asked to present, providing gooseneck microphones at each table is convenient for seated responses. In addition, it is helpful to have a wireless handheld microphone available for presenters who want to stand or roam while they present.

TECHNOLOGY MANAGERS want a Sound Reinforcement system that is "set it and forget it." These managers depend on a setup that can't be tampered with and is easy to train instructors to use.

For a more in-depth discussion on Sound Reinforcement systems design, we recommend
AUDIO ENGINEERING FOR SOUND REINFORCEMENT, by John Eargle and Chris Foreman.
Find more information on this textbook here: http://www.jblpro.com/press/audeng_book/book.html.

THE CORE BUILDING BLOCKS OF A HARMAN SOUND REINFORCEMENT SYSTEM FOR ACTIVE LEARNING CLASSROOMS

WMS Series Wireless Mic Systems

DAM Series Gooseneck Mic Systems

MICROPHONES
In an active learning classroom, a Wireless Clip-On (or lavaliere) microphone is traditionally used for the instructor, a Wireless Handheld for standing student responses and a Gooseneck or Boundary microphone for speaking at a lectern or seated at a desk. AKG by HARMAN is a leading manufacturer of high-quality microphones.
For more information, visit www.akg.com.

Soundweb London Series DSP

DIGITAL SIGNAL PROCESSORS
Digital Signal Processors (DSP) aid in pre-configuring loudspeakers in a room. DSPs are useful in active learning classrooms, because they can automatically mix microphone inputs and separate audio into different zones for room presets. BSS Audio by HARMAN is a leader in DSP technology.
For more information, visit www.bssaudio.com.

DriveCore™ Install Series Amplifiers

AMPLIFIERS
To power passive loudspeakers, you need a reliable amplifier. Crown by HARMAN manufactures a broad range of two-, four- and eight-channel amplifiers, which range from 75W to 2500W per channel, are networkable and have onboard DSP. Multichannel amplifiers are excellent for separating a large active learning space into multiple zones.
For more information, visit www.crownaudio.com.

CBT Series Column Array Loudspeakers

LOUDSPEAKERS
An active learning classroom may have several different loudspeaker requirements, such as ceiling speakers for distributed audio and surface mounted speakers for music/voice playback. JBL by HARMAN is trusted by professionals around the world for manufacturing high-quality, installed sound loudspeakers.
For more information, visit www.jblpro.com.

TIPS FOR SOUND REINFORCEMENT SYSTEMS IN ACTIVE LEARNING CLASSROOMS

• Wireless microphones should be available for instructors and students. Gooseneck microphones should be mounted onto student tables.
• Loudspeakers should provide high intelligibility and thorough coverage for all seated listeners.
• Basic control of volume and audio source selection should be available for users.
• Assisted Listening System should be compatible with the system.
• Emergency Paging System should be capable of muting room PA system.
• System should be expandable to provide future input and output connections.

For more help on finding resources for HARMAN audio brands, visit http://info.harmanpro.com.

HARMAN SOUND REINFORCEMENT SYSTEM CONCEPT FOR ACTIVE LEARNING CLASSROOMS
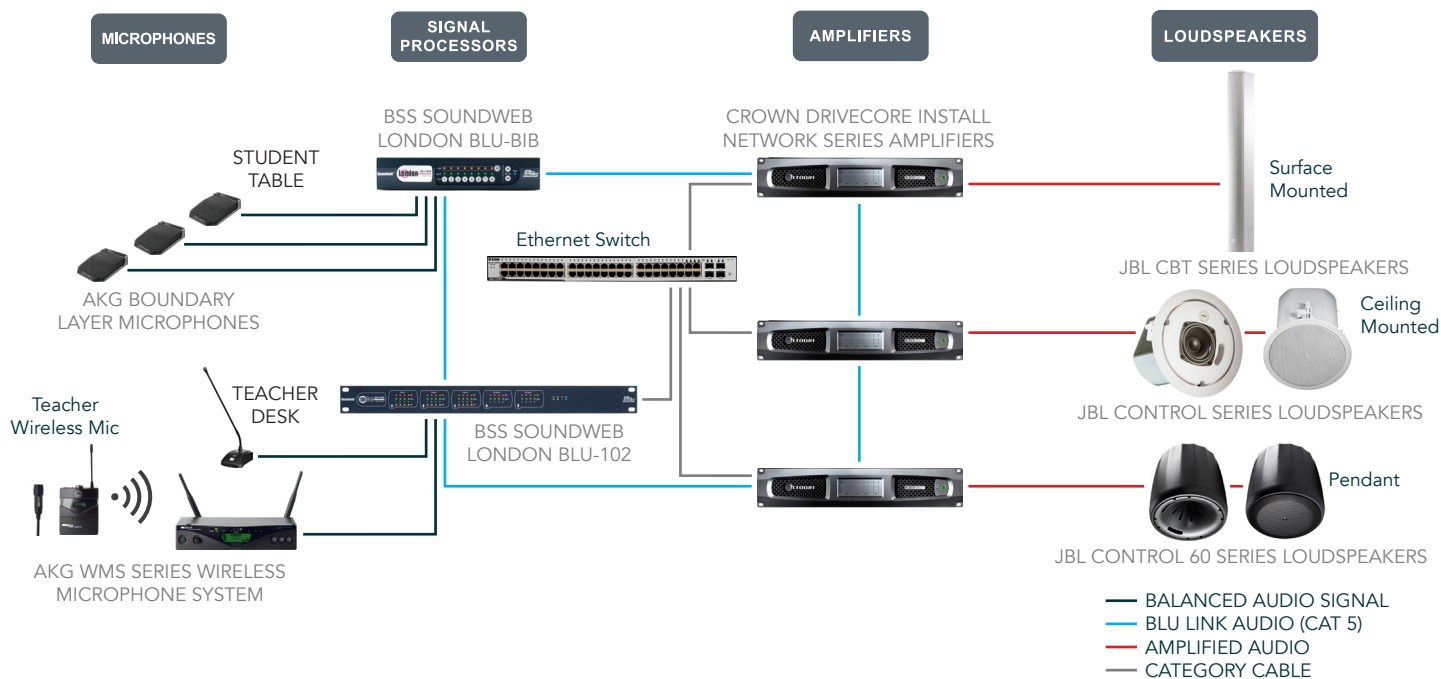
SOUND REINFORCEMENT SYSTEM RESOURCES

AKG Installed Sound Application Guide: http://www.akg.com/media/db/10249/1308_akginstalledsoundcatalogue_en.pdf

Audio Architecht Guide to Audio Networking: http://audioarchitect.harmanpro.com/en-US/audio-architect-networking

Crown Amplifier System Design Tools: http://www.crownaudio.com/en-US/tools/calculators

JBL Professional Speaker Selector Tool: http://www.jblpro.com/www/product-support/speaker-selector

JBL Speaker System Design Software: http://www.jblpro.com/www/products/installed-sound/system-design-software

WHAT IS A COLLABORATION & CONFERENCING SYSTEM?

Collaboration and Conferencing Systems facilitate a presentation through screen mirroring of wireless devices, provide access to cloud-based services, like web conferencing and file sharing, and enable the ability to record lectures for online archiving or real-time streaming.

FOR INSTRUCTORS, the presentation system provides secure access to content and applications. When a class concludes, the presenter can easily share files via a QR code, eliminating the need for paper handouts. A Lecture Capture Encoder allows instructors to record their lesson content in real-time to create video files for their students to watch before future classes and/ or to stream live over the web to distance learners. Web conferencing enables instructors to connect their classes with other sites for expanded learning opportunities.

STUDENTS benefit from the presentation system, because it empowers them to collaborate proactively with the rest of the class through their own wireless devices (BYOD), using screen mirroring. Thanks to QR code sharing, students can instantly pull down presentation content from the instructor to their devices for independent study. Web conferencing gives students a chance to connect with classmates in distant locations.

TECHNOLOGY MANAGERS like collaboration systems, because they can replace the room PC. This reduces energy use, software license costs and maintenance/startup time. The conferencing system can also be managed remotely through the help desk.

THE CORE BUILDING BLOCKS OF A HARMAN COLLABORATION & CONFERENCING SYSTEM

Enzo®

CONTENT SHARING PLATFORM
Enzo® by AMX is a PC replacement that allows users to present directly from their devices through wireless screen mirroring. Enzo includes onboard web-based applications, like a web browser, Skype®, MirrorOp® and document viewers.

Sereno™

VIDEO CONFERENCING CAMERA
Using a Sereno at each student table can be a cost-effective option for individual web conferencing, where a Pan-Tilt-Zoom Camera is cost prohibitive. The Sereno has a 120-degree field of view, a retractable shutter and USB connectivity.

H.264 Encoder

LECTURE CAPTURE ENCODER
The AMX H.264 Encoder connects directly to sources, including PCs, cameras and set-top boxes, and provides the onramp to stream video on a network. Once video is on a network, it can be played back in a variety of situations, such as on displays throughout a building, in a window within a digital signage message or using a network media solution, like AMX's Vision 2. Connect an H.264 Encoder to a camera to capture lectures, make them available live and record them for future playback. Users can also stream lectures to students watching live throughout the world on conference room displays, PCs or mobile phones. These robust encoders offer standardized, bandwidth-efficient encoding for SD and HD sources.

Alero

WEB CONFERENCING AUDIO MIXER
The AMX Alero Web Conferencing Audio Mixer is a dedicated microphone mixer for up to eight microphones, designed specifically for web conferencing applications, such as Lync® or Skype®. It also supports video teleconferencing (VTC) and audio conferencing systems.

Boundary   Gooseneck
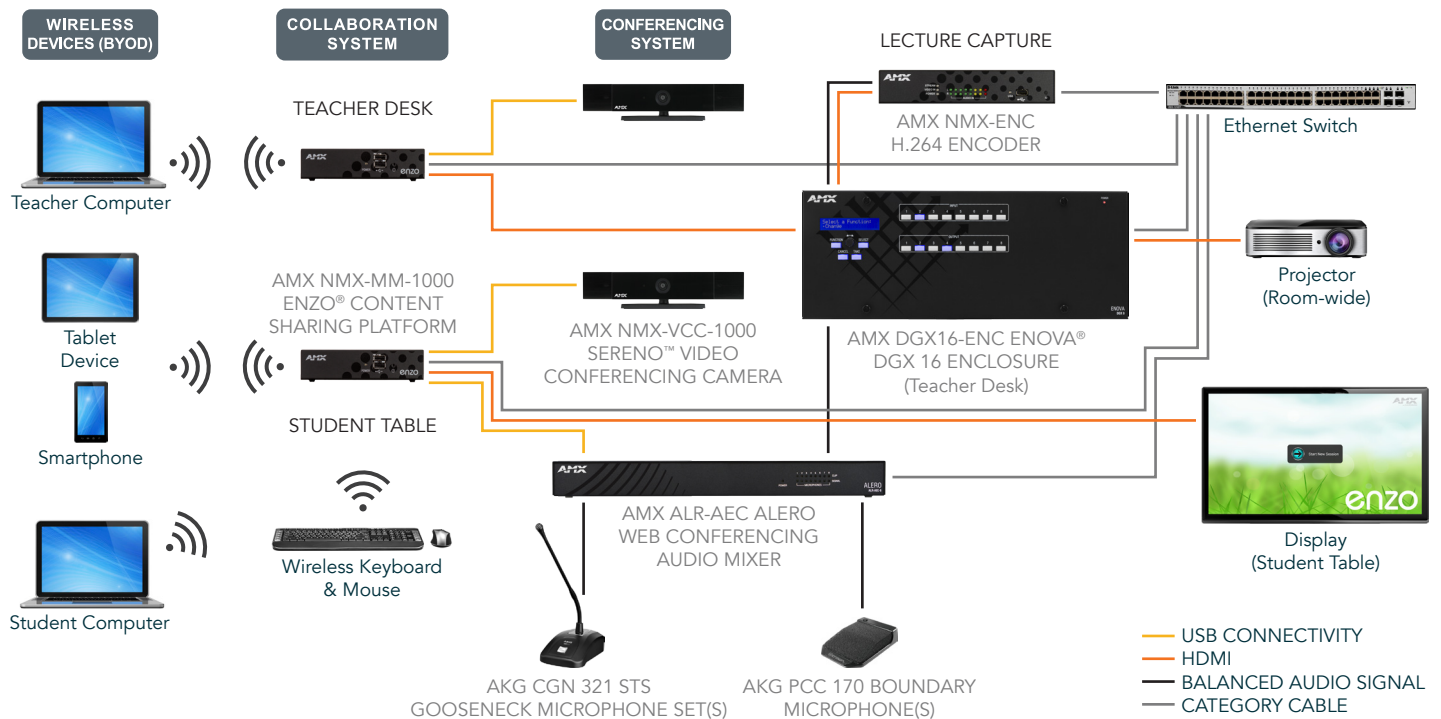Microphone Microphone

BOUNDARY & GOOSENECK MICROPHONES
Boundary microphones and Gooseneck microphones are excellent choices for audio conferencing applications. Boundary microphones provide a wide pickup pattern for picking up multiple people seated close to each other. Gooseneck microphones are preferred for individuals who require their own microphones. They provide excellent isolation between seats. AKG by HARMAN has a diverse offering of Boundary and Gooseneck microphones that are perfect for conferencing systems.

TIPS FOR COLLABORATION & CONFERENCING SYSTEMS IN ACTIVE LEARNING CLASSROOMS

- Provide at least one Boundary or Gooseneck microphone for every two seats.
- If using a camera for video conferencing, note line-of-site issues.
- If using a Pan-Tilt-Zoom camera, provide a button on or near the Boundary or Gooseneck microphone for a presenter to push, so the camera can zero-in on their location.
- Plan network permissions before installing Enzo, so presenters and students have access to files and can use the onboard applications.
- Provide appropriate AV cables for collaboration system at student tables if wireless screen-sharing capabilities are prohibited.

COLLABORATION & CONFERENCING SYSTEM CONCEPT FOR ACTIVE LEARNING CLASSROOMS

COLLABORATION & CONFERENCING SYSTEM RESOURCES:

ENZO® by AMX: http://www.amx.com/products/NMX-MM-1000.asp

SERENO™ by AMX: http://www.amx.com/products/NMX-VCC-1000.asp

ALERO by AMX: http://www.amx.com/products/ALR-AEC-8.asp

H.264 Encoder by AMX: http://www.amx.com/products/NMX-ENC.asp

AKG Boundary Microphones: http://www.akg.com/pro/microphones/speech-spoken-word/boundary-layer-microphones

AKG Gooseneck Microphones: http://www.akg.com/pro/microphones/speech-spoken-word/gooseneck-microphones

RESOURCE MANAGEMENT FOR ACTIVE LEARNING CLASSROOMS: AV ASSET MANAGEMENT

It happens far too often. The institution invests in AV equipment, only to find that they are constantly chasing issues due to the lack of a centralized system for monitoring and managing the equipment. Even more frustrating, support personnel must visit each room in person to troubleshoot problems, since they have no way to communicate remotely with the AV equipment. In an active learning classroom, the total number of AV systems increases significantly. Instead of just one centralized system, there are many subsystems, including one at each student table, that have to be evaluated to make sure they are operational. This can become very time consuming!

Resource Management Suite (RMS) Enterprise is scalable client/server-based software for IT and AV managers that provides remote management and scheduling capabilities for AV assets and building systems. The software features a user-friendly dashboard, making it easy to centralize the management and monitoring of AV equipment, lights, HVAC and other building functions. This allows IT and AV managers to proactively maintain AV displays before a bulb burns out and receive immediate notification when a device goes offline.
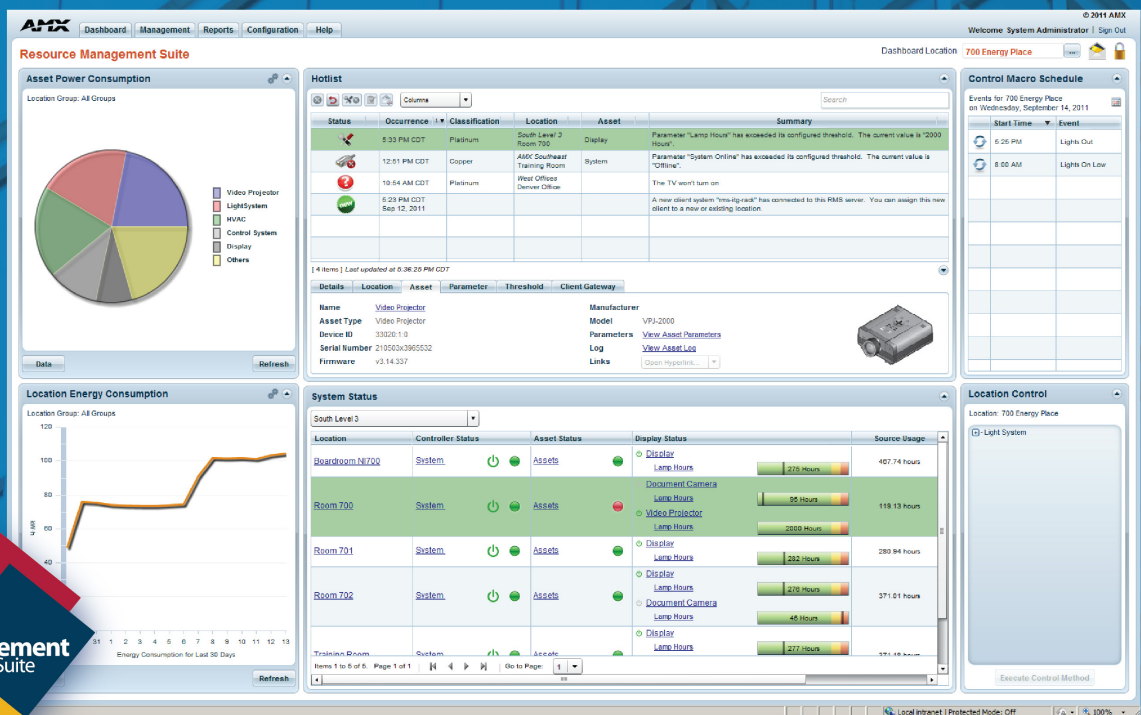
The RMS Dashboard

WIDGET-BASED GUI
RMS Enterprise includes a fully customizable dashboard layout for each secure user, including visual bar graphs, user-defined status and notifications, and hotlists displaying all current system exceptions and issues.
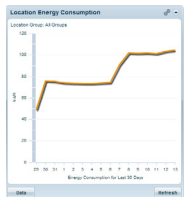
GO GREEN WITH ENERGY MANAGEMENT
Save money and the environment by remotely turning off equipment when the active learning classroom is empty or on weekends. Track and run reports on energy usage for monitored assets.

CENTRALIZE THE AV SUPPORT DESK
Centrally monitor AV technology problems right from your IT support desk, and remotely control AV devices in the active learning classroom when instructors call in for help.

SOLVE TECHNOLOGY ISSUES PROACTIVELY
With active monitoring of AV technology in the active learning classroom, AV support staff can setup automatic email alerts that give them the ability to proactively respond to issues as soon as they arise.

RESOURCE MANAGEMENT FOR ACTIVE LEARNING CLASSROOMS: SCHEDULE MANAGEMENT

A college campus runs on classes and events, which are allocated facility resources through a master calendar. Schedule management systems, like Exchange, Lotus Notes or Google Calendar, provide a platform to centrally create and change schedules, so campuses can efficiently manage their classrooms. Once this schedule is created, however, how do students and instructors know if there is a room change, time change, cancellation or if that space is available for the next hour? An active learning classroom can become a very popular room, especially when its users get comfortable with all of the technology inside it, so this space becomes a high-demand place. In order to effectively use this expensive space, a flexible and easy-to-use scheduling system is required.

AMX's RMS Enterprise Scheduler is a comprehensive room schedule module that assists students and instructors in locating rooms by displaying the scheduled events on a touch panel adjacent to room entrances. It eliminates delays in class start times by automating the room technology, thereby eliminating the time typically spent on equipment setup.

CORE SCHEDULE SOLUTION PRODUCTS

RESOURCE MANAGEMENT SUITE ENTERPRISE SCHEDULER
Schedule rooms from any touch panel or PC. Integrate RMS with many popular scheduling platforms and display the room schedule on touch panels.

MODERO S SERIES TOUCH PANEL
Modero is a cost-effective way to display schedules outside any room. Mount on virtually any surface, including glass, and easily view red/green room availability lights to determine occupancy.

QUICK RESPONSE SCHEDULING
An alternative to a touch panel, this sleek acrylic wall panel displays the room schedule on mobile devices by scanning a QR code. It is elegant looking and simple to install without wires.

For more information about Resource Management Suite, please visit: http://www.amx.com/resourcemanagementsuite/

BRINGING TOGETHER THE HARMAN ACTIVE LEARNING CLASSROOM AV SYSTEM

Our diverse catalog of audio, video and control technology builds comprehensive audio visual systems for Active Learning Classrooms.

In this diagram, we demonstrate an approach to merging AV Control & Automation, Collaboration & Conferencing, Sound Reinforcement, and Room Scheduling & AV Asset Management systems together to create one unified system.

For more technical resources on our brands and product families featured in this diagram, we suggest the following websites:
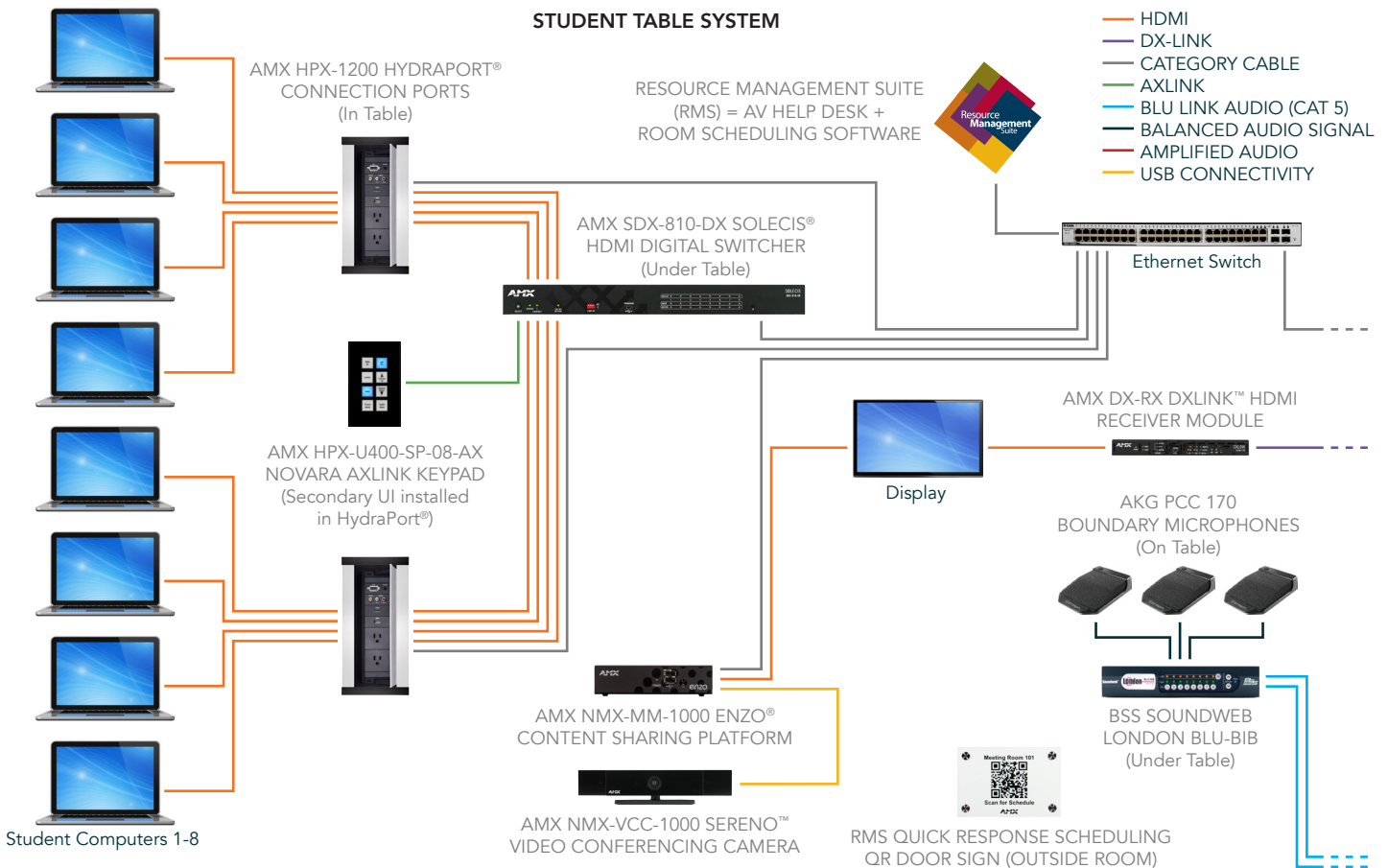
AKG
http://www.akg.com/pro/microphones/speech-spoken-word/boundary-layer-microphones
http://www.akg.com/pro/microphones/speech-spoken-word/gooseneck-microphones
http://www.akg.com/pro/wireless/wireless-microphones

AMX
http://www.amx.com/productinfo/
http://www.amx.com/products/categoryDigitalSwitchers.asp

BSS
http://bssaudio.com/en-US/product_families/soundweb-london

crown
http://www.crownaudio.com/en-US/product_families/drivecore-install-series-network

JBL PROFESSIONAL
http://jblpro.com/www/products/installed-sound/cbt-series
http://jblpro.com/www/products/installed-sound/control-contractor-series

HARMAN ACTIVE LEARNING CLASSROOM AV SYSTEM CONCEPT

STUDENT TABLE SYSTEM

HDMI
DX-LINK
CATEGORY CABLE
AXLINK
BLU LINK AUDIO (CAT 5)
BALANCED AUDIO SIGNAL
AMPLIFIED AUDIO
USB CONNECTIVITY

AMX HPX-1200 HYDRAPORT® CONNECTION PORTS (In Table)

RESOURCE MANAGEMENT SUITE (RMS) = AV HELP DESK + ROOM SCHEDULING SOFTWARE

Ethernet Switch

AMX SDX-810-DX SOLECIS® HDMI DIGITAL SWITCHER (Under Table)

AMX DX-RX DXLINK™ HDMI RECEIVER MODULE

AMX HPX-U400-SP-08-AX NOVARA AXLINK KEYPAD (Secondary UI installed in HydraPort®)

Display

AKG PCC 170 BOUNDARY MICROPHONES (On Table)

BSS SOUNDWEB LONDON BLU-BIB (Under Table)

AMX NMX-MM-1000 ENZO® CONTENT SHARING PLATFORM

AMX NMX-VCC-1000 SERENO™ VIDEO CONFERENCING CAMERA

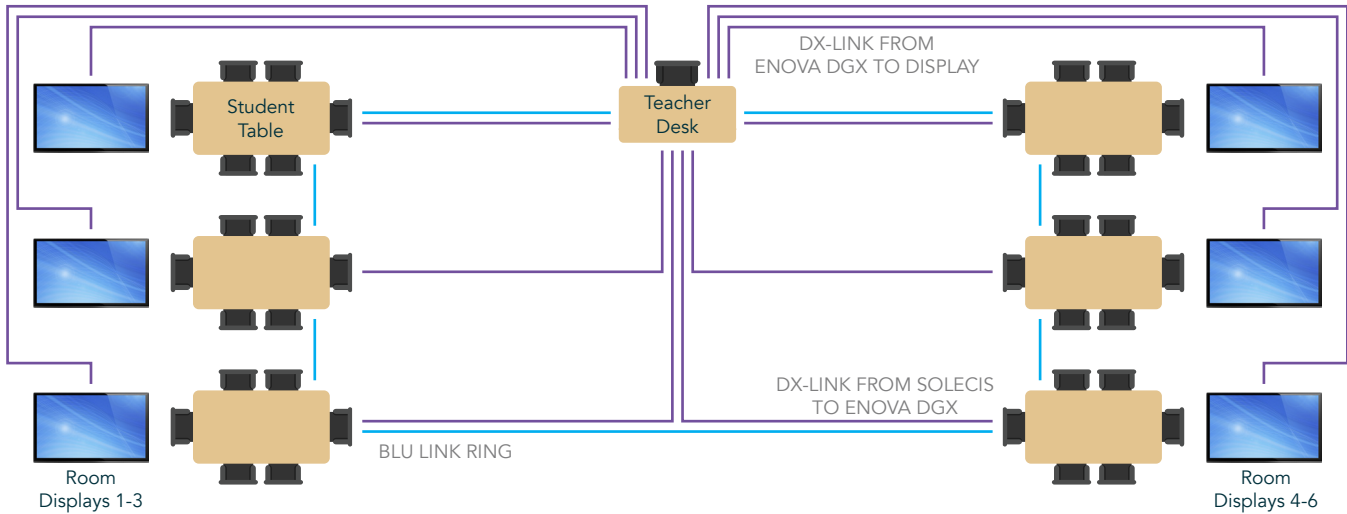RMS QUICK RESPONSE SCHEDULING QR DOOR SIGN (OUTSIDE ROOM)

Student Computers 1-8

FOR MORE INFORMATION

Email us: education@harman.com

To contact a member of our Education Business Development Team,
visit: http://www.amx.com/automate/contactamx/

DXLINK AND BLU LINK TOPOLOGY

DX-LINK FROM
ENOVA DGX TO DISPLAY

Student Table

Teacher Desk

DX-LINK FROM SOLECIS
TO ENOVA DGX

BLU LINK RING

Room
Displays 1-3

Room
Displays 4-6

HARMAN ACTIVE LEARNING CLASSROOM AV SYSTEM CONCEPT (continued)

TEACHER DESK SYSTEM

AMX HPX-600 HYDRAPORT®
CONNECTION PORTS

AMX MXT-1001 MODERO X® SERIES
TABLETOP TOUCH PANEL
(Master UI)

Teacher Laptop

AMX NMX-VCC-1000
SERENO™ VIDEO
CONFERENCING CAMERA

Ethernet Switch

AMX NMX-MM-1000 ENZO®
CONTENT SHARING PLATFORM

AMX DGX16-ENC ENOVA®
DGX 16 ENCLOSURE
(Teacher's Desk)

AMX NMX-ENC
H.264 ENCODER

Video Player

AKG WMS470 WIRELESS
MICROPHONE SYSTEM
(Teacher's Mic)

AKG CGN521 STS GOOSENECK
MICROPHONE SET
(On Teacher's Desk)

AMX DX-RX DXLINK™ HDMI
RECEIVER MODULE

Projector
(Room-wide)

BSS SOUNDWEB LONDON
BLU-160 SIGNAL PROCESSOR

CROWN DCi 8l300N
DRIVECORE™ INSTALL
NETWORK SERIES AMPLIFIER

JBL CONTROL
SERIES LOUDSPEAKERS

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6

— HDMI
— DX-LINK
— CATEGORY CABLE
— BLU LINK AUDIO (CAT 5)
— BALANCED AUDIO SIGNAL
— AMPLIFIED AUDIO
— USB CONNECTIVITY

About HARMAN Professional Solutions

HARMAN Professional Solutions is the world's largest professional audio, video, lighting, and control products and systems company. We serve the entertainment and enterprise markets with comprehensive systems, including enterprise automation and complete IT solutions for a broad range of applications. Our brands comprise AKG Acoustics®, AMX®, BSS Audio®, Crown International®, dbx Professional®, DigiTech®, JBL Professional®, Lexicon Pro®, Martin®, Soundcraft® and Studer®. These best-in-class products are designed, manufactured and delivered to a variety of customers, including tour, cinema and retail as well as corporate, government, education, large venue and hospitality. In addition, our world-class product development team continues to innovate and deliver groundbreaking technologies to meet our customers' growing needs. For scalable, high-impact communication and entertainment systems, HARMAN Professional Solutions is your single point of contact.