

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 1 of 31

TABLE OF CONTENTS

I.	Purpose.....	2
II.	Scope	3
III.	Standards	3
	1. Section 1: General Requirements.....	3
	2. Section 2: Smart Classroom – Emerging Technologies.....	8
	3. Section 3: AV Design Considerations.....	8
	4. Section 4: AV Learning Space Classification.....	9
	4.1 Classroom.....	9
	4.2 Auditoria.....	10
	4.3 Laboratory - Dry.....	11
	4.4 Laboratory - Wet.....	12
	4.5 Learning Space Classification Chart.....	13
	5. Section 5: Enabling Technologies.....	13
	5.1 AV Control and Automation System	13
	5.2 Sound Amplification System (Audio Reproduction).....	15
	5.3 Interactive Whiteboard Capabilities	17
	5.4 Audience Response System.....	17
	5.5 AV Video/Data Projectors.....	19
	5.6 Projectors Surfaces	20
	5.7 Lecture Capture (Distance Learning).....	22
	5.8 Videoconferencing.....	23
	5.9 Document Camera.....	23
	5.10 Flat Panel Displays (and Mounts)	24
	5.11 Technology Furniture.....	25
	6. Section 6: Management and Support.....	27
	6.1 Remote Resource Management System	27
	6.2 Digital Signage Systems.....	27
	7. Section 7: Professional Development & Training	28
IV.	Related Standards	29
V.	Exceptions or waiver Requirements.....	29
VI.	Requests for Clarification.....	29
VII.	References	30
VIII.	Key Terms & Glossary	30
IX.	Document History	31

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 2 of 31

I. PURPOSE

The purpose of the AV Smart Classroom Standards is to provide minimum performances and criteria for AV components and systems that will meet the needs of institutional learning (SLOs), teaching methods and styles, District/campus communications, research, operational systems, and ADA and Section 508 compliance requirements.

The District provides education programs to the community that meet the changing needs of students for academic and occupational preparation. Providing robust, sustainable technology systems at each of the nine colleges will enhance these educational programs. This IT standard is meant to provide minimums and guidelines for the design, construction and renovation of Smart Classrooms at the Los Angeles Community College District (LACCD) including, but not limited to, East Los Angeles College (ELAC), Los Angeles City College (LACC), Los Angeles Harbor College (LAHC), Los Angeles Mission College (LAMC), Los Angeles Pierce College (LAPC), Los Angeles Southwest College (LASC), Los Angeles Trade Tech College (LATTTC), Los Angeles Valley College (LAVC), West Los Angeles College (WLAC), and the Los Angeles City College District Office, collectively LACCD, satellite campuses and select facilities.

The goal is to provide instructional technologies that are simple and intuitive to use for teaching and for collaboration with tools such as video, audio and recording. The goal is to design an environment where classrooms are standardized to provide consistent learning environments and that are adequately maintained and supported for optimum operation and maximum utilization. The intent is for the instructors to be immediately familiar with the teaching space layout, with the audiovisual equipment and how to control the system, regardless of which multi-media space they happen to be assigned to, so that they can focus on the business of educating rather than spending valuable time trying to understand how to use the technologies.

This standard is meant to ensure a fully integrated enterprise AV Smart Classroom that is versatile and dynamic that provides:

1. Ease of use
2. Intuitive design/layout
3. Integration and supportability
4. Reliability and performance
5. Accessible for physically challenged user access to telecommunications and security devices
6. Cost-Effective for initial construction cost and user life-cycle cost
7. Functional/Operational for integrated control of building operational systems and building automated systems
8. Productive for user health and comfort, and business/organization needs
9. Secure/Safe for building security access, surveillance, fire/smoke detection and alarm systems; and user LAN/WAN network security

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 3 of 31

10. Sustainable—Enhance Indoor Environmental Quality; Optimize O&M Practices for high performance optimization of building controls and operational systems

II. SCOPE

The AV Smart Classroom Standard applies to all LACCD learning environments: classroom lecture, auditoriums, class laboratories, research/non-class laboratories, and conference rooms. This is intended for use in all new construction or for renovation projects which revamp existing classroom space throughout the LACCD. These guidelines will standardize minimum performance requirements of Smart Classroom technologies and functions throughout the district. The standard will provide parameters regarding LACCD requirements for classrooms, but will require interpretation and adjustment to suit the specific situations presented by instructional and academic needs across the district.

General classroom types shall accommodate the academic needs of a variety of disciplines, departments, and programs while maintaining common technologies and standard interfaces to promote the ease of use for faculty as they transition from any classrooms across the LACCD. All guidelines within this Smart Classroom Standard will be consistent with approved LACCD Technology Standards.

III. STANDARDS

1. Section 1: General Requirements

1.1 Infrastructure

All smart classrooms should have infrastructure allowing for the spaces to be equipped with AV technologies (as mentioned in this document) either at the time of initial integration or potential for future growth.

1.2 Communications Outlets

Communications (data) outlets are to be installed in the Smart Classroom locations in compliance with applicable LACCD standards.

1.3 Acoustics

Smart Classroom acoustics must meet with applicable LACCD standards.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 4 of 31

1.4 Electrical

Smart Classroom electrical design must meet with applicable LACCD standards.

1.5 Climate Control / HVAC

Smart Classroom climate control (HVAC) must meet with applicable LACCD standards.

1.6 Lighting

Smart Classroom lighting design must meet with applicable LACCD standards.

1.7 Accessibility (ADA) / Section 508 Compliant

AV Smart Classroom technologies must comply with the Americans with Disabilities Act (ADA), specifically Section 508 of the Rehabilitation Act of 1973, as amended.

1.8 Data Center (Centralized Storage)

Smart Classroom data files will be stored in centralized storage. Refer to applicable LACCD standards.

1.9 AV Remote Resource Management System (Centralized Control & Monitoring)

Each Smart Classroom AV system will be connected to the campus AV network monitoring system. Refer to applicable LACCD standards.

1.10 Applications

Smart Classrooms should have applications that comply with applicable LACCD standards.

1.11 Physical Security

Smart Classroom physical security must meet with applicable LACCD standards. The technology equipment must have features to prevent theft and tampering such as locking device, password protection, etc.

1.12 Sustainability Guidelines

All Smart Classroom technology design and equipment must meet applicable sustainability and energy efficiency guidelines.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 5 of 31

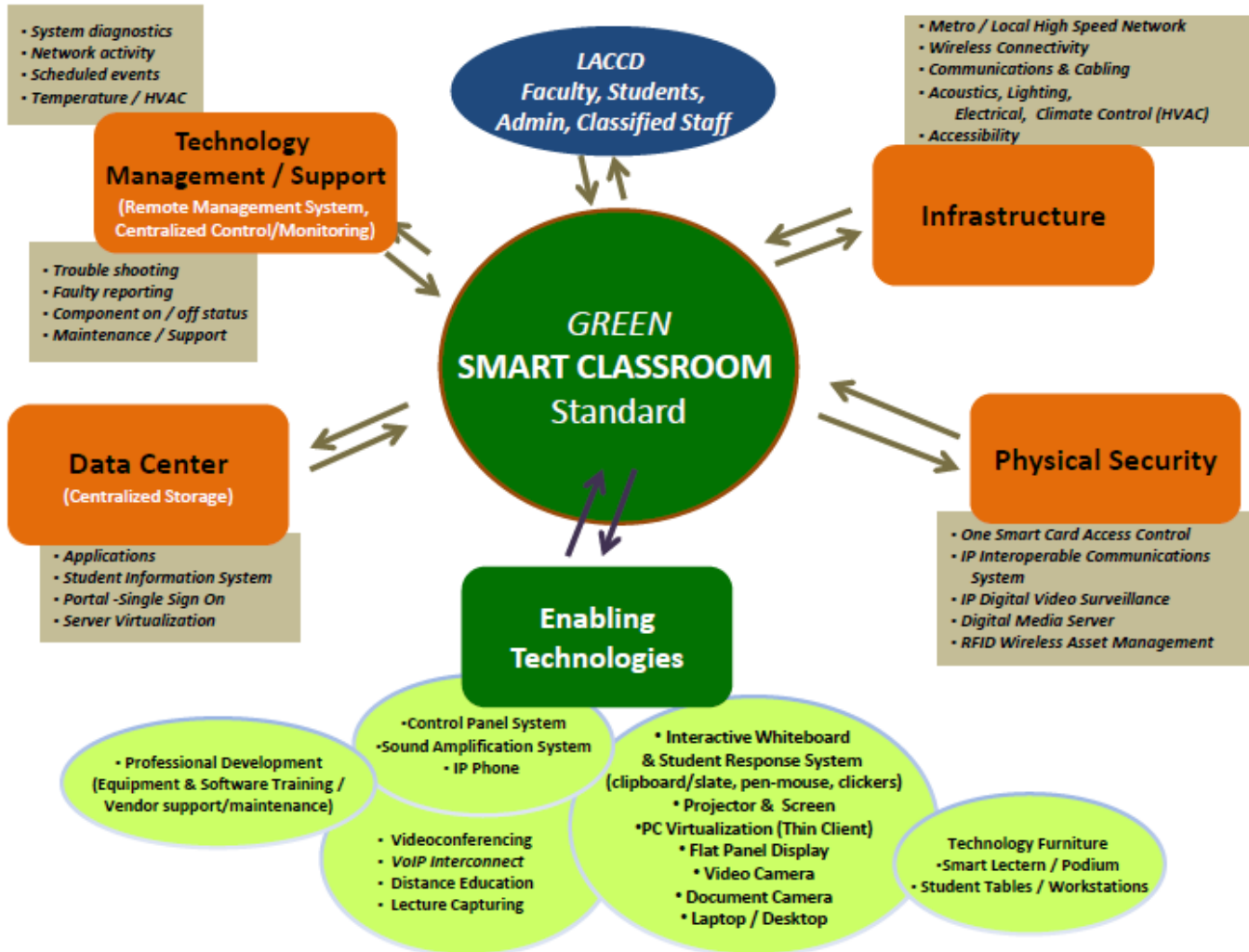


Figure 1: AV Smart Classroom Standard

The figure above illustrates the relationships of the infrastructure, physical security, technology management/support, and data center working with the enabling technologies involved in the design and support of all Smart Classrooms throughout LACCD.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 6 of 31

Smart Classroom – Traditional Technology

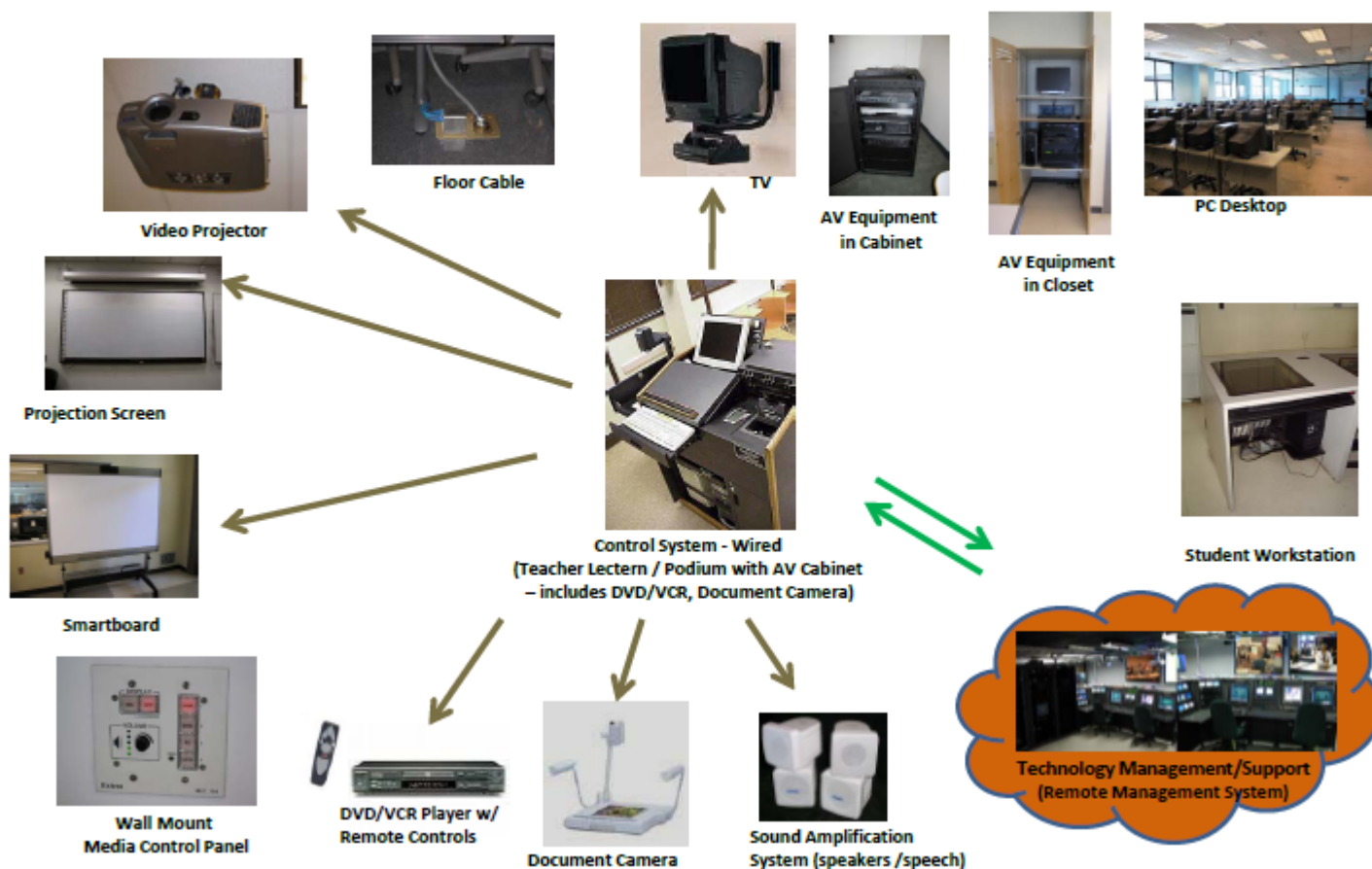


Figure 2: Smart Classroom – Traditional Technology

The figure above illustrates what traditional technologies are currently in learning environments at most LACCD campuses.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 7 of 31

SMART CLASSROOM – NEW & EMERGING TECHNOLOGIES

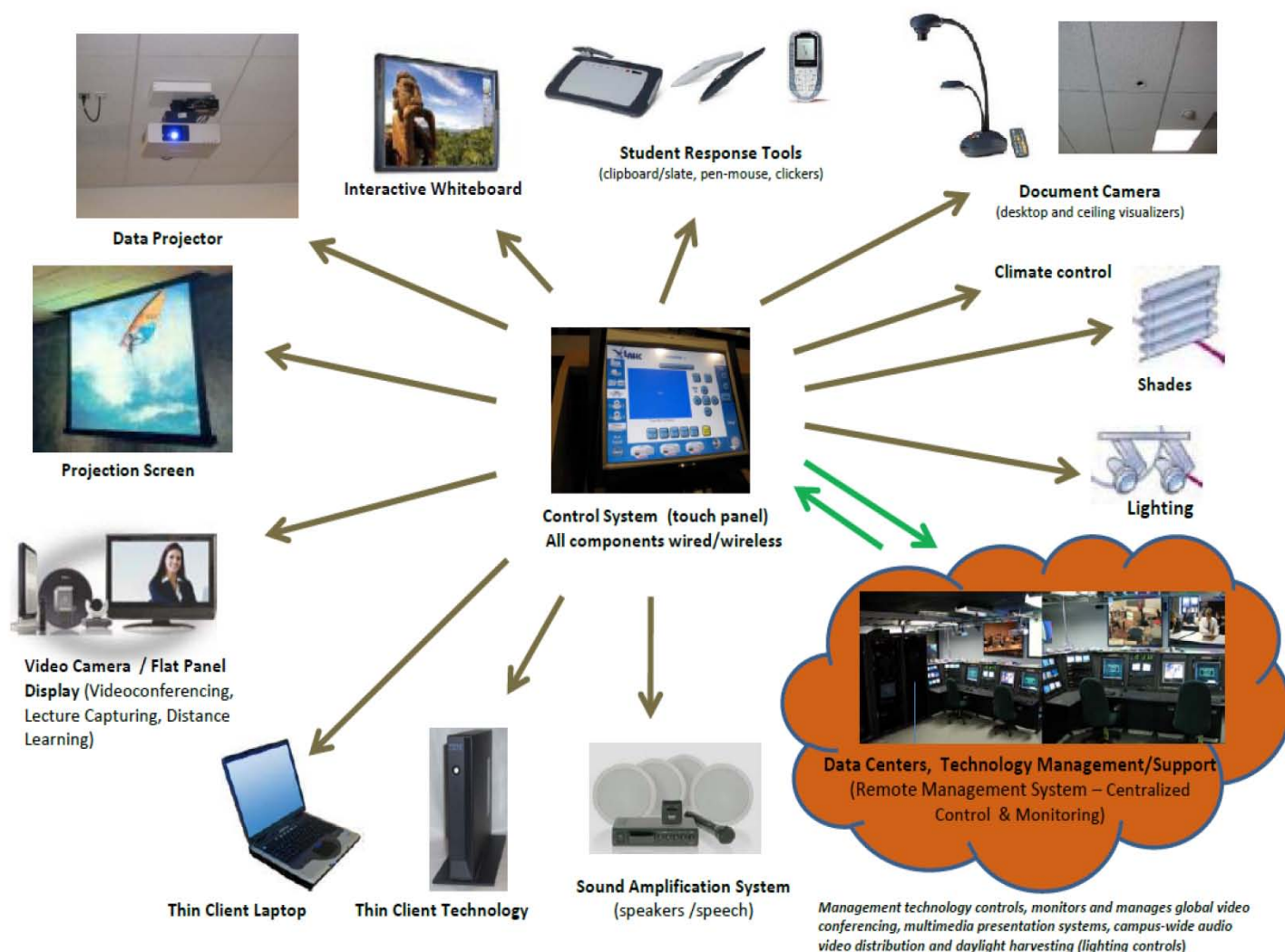


Figure 3: Smart Classroom – New and Emerging Technology

The figure above illustrates the LACCD's goal of this standard – the ability for instructor to control the technologies in the classroom, and the ability for the Technology Management/Support to control, monitor and manage all Smart Classroom technologies throughout the District.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 8 of 31

2. Section 2: Smart Classroom – Emerging Technologies

List of technologies within the AV Smart Classroom might include:

- Computers (PC Virtualization / Thin Client technology)
- AV Control and Automation System (keypad, touchpanel, and control processors)
- AV Data/Video Projector
- AV Document Camera
- AV Flat Panel Display
- AV Interactive Whiteboard technologies
- AV Lecture Capture System
- Videoconferencing System
- Projection Screens and Surfaces
- Audience Response Systems
- AV Sound Amplification System
- Technology Furniture
- AV Remote Resource Management Center

3. Section 3: AV Design Considerations

The following must be carefully considered in the design of AV Smart Classrooms:

- Visibility (placement, size and view ability of displays and projection screens)
- Lateral viewing angles of students (pan angles not to exceed 45 degrees off-axis)
- Vertical viewing angles of students (tilt angles not to exceed 15 degrees off-axis)
- Line of sight (camera placement and angles)
- Fixed vs. mobile devices
- Equipment mounting, placement of interactive and peripheral equipment
- Use of multiple displays as content reinforcement
- Desirable locations for connection points (power/data)
- Multiple AV input locations (flexibility)
- Instructor workstation (fixed vs mobile)
- AV devices security, key access
- Accessibility to technology (ADA, access, wheelchair, hearing assistance)

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 9 of 31

4. Section 4: AV Learning Space Classification

This section describes three different learning space types that are classified as classrooms, auditoriums, and laboratories.

Consider collaborative, workgroup, and flexible ‘smart’ spaces for student participation and interactivity. Infrastructure and inputs locations must be carefully designed to address current and future needs for flexibility of spaces. Even if inputs are not initially provided, base building infrastructure should include the provisioning of appropriate pathways.

Discipline specific spaces may require additional AV components. Infrastructure should be designed for maximum future AV requirements.

4.1 Classroom¹

The classroom space type should have flexibility, durable finishes to anticipate maximum use, and integrated utility lines such as voice, data, and power to accommodate a variety of multimedia presentations and tele- and videoconferences. These space types should have durable materials and surfaces that provide added conferencing and meeting functionality such as marker boards, writable surfaces and projection screens. Ambient lighting with dimmable controls and special accent lighting is recommended to allow user control for presentation purposes. The classroom should be designed to accommodate a variety of audiovisual equipment.



Figure 4.1a Classroom (C1)

The figure above illustrates an example small sized smart classroom which could include both a standard throw and ultra short throw data projectors: long throw projector screen and ultra short throw on dry-erase paint writing surface as an interactive whiteboard.

¹ <http://www.wbdg.org/design/conference.php>, Conference / Classroom

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 10 of 31



Figure 4.1b Classroom (C2)

The figure above illustrates an example of a regular sized smart classroom which could include dual standard throw data projectors on projection screens, and ultra short throw data projectors on dry-erase paint writing surface as interactive whiteboards.

4.2 Auditoria²

The Auditoria space types are areas for large meetings, presentations, and performances.

Sloped or stadium floors, with level terraces for each row of seating, help provide the proper sightlines from the audience to the stage. Lighting systems should be flexible to accommodate various presentation and performance venues.



Figure 4.2: Auditoria (A2)

The figure above illustrates an example of a typical sized auditorium with dual standard throw data projectors on projection screens, lecture capture camera, dry-erase paint/whiteboard writing surface as interactive whiteboard. There is a power/AV connectivity floor box on both sides of the auditoria for desired instructor lectern location.

² <http://www.wbdg.org/design/auditorium.php>, Auditorium

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 11 of 31

4.3 Laboratory - Dry³

The Dry Laboratory space type is a laboratory space that is specific to work with dry stored materials, electronics, and/or large instruments with few piped services. The laboratories defined by this space type are analytical laboratories that may require accurate temperature and humidity control, dust control, and clean power.

Dry laboratory space types are designed to accommodate project-specific work patterns and scientific equipment. As such, they tend to include design features that provide reliable working conditions in a somewhat mobile environment.



Figure 4.3: Computer Lab (L1)

³ http://www.wbdg.org/design/lab_dry.php

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 12 of 31

4.4 Laboratory - Wet⁴

Wet Laboratory space types are defined as laboratories where chemicals, drugs, or other material or biological matter are tested and analyzed requiring water, direct ventilation, and specialized piped utilities.



Figure 4.4: Science Lab (L2)

⁴ http://www.wbdg.org/design/lab_wet.php

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 13 of 31

4.5 Learning Space Classification Chart

The Learning Space Classification chart below shows room type, size, student capacity.

Room / Space Type		Size	Student Capacity Max.
C1	Classroom	Small	32
C2	Classroom	Regular	45
C3	Classroom	Large	65
A1	Auditoria	Small	70
A2	Auditoria	Regular	120
A3	Auditoria	Large	200
L1	Laboratory – Dry	*	*
L2	Laboratory - Wet	*	*

** Room size and student capacity varies on discipline. Refer to California Community Colleges Space Planning Standards for AST/STN formula.*

5. Section 5: Enabling Technologies

This section describes the different enabling technologies that provides for district management, system integration and sustainability, centralized monitoring and control, IP enabled devices, security, support, and maintenance.

5.1 AV Control and Automation System

The AV control and automation system shall include a touch panel and/or multi-button keypad that allows instructor to control the AV systems and perform functions such as AV system power on/off, lighting control, audio/video source selection, and volume control of speech and program audio systems.

Any touchscreens panel must have "tactilely discernable parallel operating systems," as per Section 508 of the Rehabilitation Act. The touchpanel or keypad control equipment shall be IP-enabled with the ability to be controlled remotely such that a central location can monitor all aspects of AV operations and maintenance. It should be a simple and intuitive control system, consistent throughout all campuses.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 14 of 31

All rooms are required to minimally contain a hardwired wall-mounted button keypad. In addition to the wall keypad, a wireless control keypad may be available. If a wireless panel is lost, stolen or if batteries are non-functioning, there will be a hard-wired control as backup. The minimum controls should include: Projector on/off, screen up/down, volume up/down, and AV source selection.

The AV control system shall be web-accessible. Faculty and staff shall have the option to access AV controls through their mobile devices.

Each college will have the option to select its AV Control and Automation System (such as Crestron, Extron, or AMX); however, at the district level, any and all control systems must be consistent and integrate with each other.

All touch panel-based control panels will have alpha numeric pass codes to prevent unauthorized system access and to prevent panels from being removed from cradles.

The AV control and automation system may include the following components:

5.1.1 Key Pad



All smart classrooms shall have hard-wired wall-mounted IP controllable panels that have a simple push button interface.

5.1.2 Touch Panel



Some smart classrooms may have a touch panel that might be lectern based, wall mounted, table top, or handheld.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 15 of 31

5.1.3 Media Interfaces



Media interfaces should at minimum include HDMI input(s), VGA input, composite audio and video inputs. Some rooms, such as flexible classrooms, may require multiple media interface input locations. Actual input types and locations are to be determined by specific room design and desired system functionality. Refer to LACCD AV Control and Automation System Standard for more information.

5.2 Sound Amplification System (Audio Reproduction)



The Sound Amplification System shall include all components to properly amplify voice and other audio sources such as Microphones, Media PC's, DVD, BluRay, LCD Projector, Flat Panel Display Audio, Ipods/MP3 Players, and any other audio source input. Wall or ceiling mounted speakers, infrared sensor, microphone/transmitter(s), amplifiers, mixers, chargers for microphones, and power may all be included as part of each sound system.

The sound amplification system should be loud enough for the particular application that the room is designed for, and be intelligible to all participants in the space. It must be stable and not prone to feedback and noise.

Speech reinforcement system design should provide the audience members in the least favored listening positions (i.e., the farthest from the talker) with the same listening experience as the audience members closest to the talker. The sound system shall provide consistent SPL (Sound Pressure Levels) throughout space. System design shall consider room size, characteristics, acoustics, etc. to ensure evenly distributed sound.

Number and location of speakers shall be based on purpose and size of the room. Wireless microphones shall be provided for the instructor. Typically, speech reinforcement will be supported via ceiling mounted speakers evenly distributed. Program audio will typically be supported via front wall mounted speakers with

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 16 of 31

additional speakers as required by room size, function and design.

Sound Amplification System can be broken down into three primary components in support of voice and media amplification:

5.2.1 Speech Reinforcement



- Used for amplification of instructor(s) and students

5.2.2 Program Audio



- Used for amplification of all AV sources in spaces

5.2.3 Assistive Listening System (ALS)



- Used with students who have varying degrees of hearing levels ranging from normal hearing acuity (e.g., students with learning disabilities, attention deficit disorders, central auditory process disorders) to students who have a profound hearing loss.
- Can be moved from class to class or permanently installed
- Can be used alone or in conjunction with personal hearing aids and cochlear implants
- Rooms with a capacity of less than 50 seats may only require auxiliary outputs for portable ALS systems. Rooms with 50 or more will require fixed ALS systems.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 17 of 31

- The Assistive Listening System must comply with the Section 508 Compliance requirements. Refer to LACCD Sound Amplification System Standard for more information.

5.3 Interactive Whiteboard Capabilities



The Smart Classroom shall have interactive whiteboard capabilities. This might include a touch-based system that integrates all interactive learning components in the classroom into one user-friendly platform: projector, multi-media system, and software. It shall allow connection to online library of editable templates, flipcharts, ready-made lessons, best practices, and resources. If board based, it shall have a surface that can be poked, touched or leant upon without disturbing the lesson. (See Section 5.6 Projector Surfaces) It must have capabilities such as: manipulating text and images, taking notes in digital ink, saving notes for review via e-mail, the Web or print, showing and writing notes over educational video clips, and showcasing student presentations.

All touchscreens based systems must have "tactilely discernable parallel operating systems," as per Section 508 of the Rehabilitation Act. See LACCD Interactive Whiteboard Standard for more information.

5.4 Audience Response System

An audience response system allows an instructor to present a question or problem to the class; allows students to enter their answers into some kind of device; and instantly aggregates and summarizes students' answers for the instructor, usually as a histogram.⁵

5.4.1 Clipboard / Slate with Stylus



⁵UMassAmherst, Scientific Reasoning Research Institute, <http://srri.umass.edu/topics/crs>

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 18 of 31

The instructor shall be able to use a clipboard / slate with stylus with the interactive whiteboard. The clipboard/slate must allow instructor to create and deliver lessons from anywhere in the classroom. It must enable the instructor to move around the classroom, controlling the lesson from anywhere in the classroom – making any learning environment versatile. Also, it must enable students to fully interact without moving from their seats. Instructors must be able to move about and connect with students. Secured storage for the Clipboard / Slate with Stylus is to be provided within a lockable cabinet.

5.4.2 Clicker



Students should be able to use a clicker-based device with the interactive whiteboard system. The clicker must be an easy to use tool, hand-held device for polling, debates and pre-planned participatory exercises alike, ready to query the class at any time. The hand-held tool shall offer instructors the opportunity to instantly gauge student comprehension and adjust lesson plans based on needs. System must have capability to download learner results into spreadsheets and lesson plans for clear achievement records over time. The clicker must also work with 3rd party interactive whiteboards. A secured lockable storage for the clickers must be provided in the classroom.

5.4.3 Cell phone



Students should be able to use cell phone or tablet as a response system with the interactive whiteboard.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 19 of 31

5.5 AV Video/Data Projectors

Each smart classroom will feature digital, high-resolution video/data projectors with appropriate lumens as defined in the LACCD Video/Data Projector Standard. The projectors will be capable of both wired and wireless communication that will display content from high-resolution source devices such as HD video content via HDMI, document camera, laptop or tablet computers in each room.

Based on discipline, intended tasks, room size, shape, and number of students, the projection resolution, lumens, contrast, number of projectors, etc. may vary and must be designed accordingly with appropriate learning environment. For example, higher resolution and dynamic color may be required for art and photography class while classes such as accounting for example do not require dynamic color reproduction. Some programs require multiple projectors.

The video/data projectors must have multiple digital and analog inputs and be flexible for the addition of potential emerging technologies. Projectors must be Closed Captioning (CC) capable.

Based on the learning environment, the following projection types and methods such as long throw (ceiling mounted) or short throw wall-mounted shall be considered. Coordinate video/data projector design with ceiling light fixtures so as not to conflict with visibility.

Refer to AV LACCD Video/Data Projector Standard.

5.5.1 Standard or Long throw ceiling mounted



5.5.2 Short Throw and Ultra Short Throw (with Interactive Whiteboard Capabilities)



LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 20 of 31

5.5.3 Large Venue projection

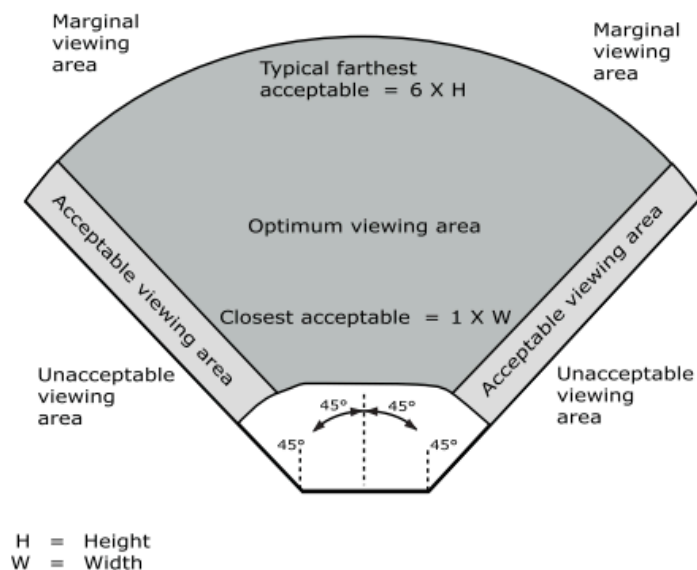


5.6 Projectors Surfaces

Viewing angles must be considered for projector surfaces. See figure below for optimum and acceptable viewing areas.

Direct and ambient lighting shall be considered in placement of projection systems. Consider details such as location of windows and shades to address ambient light and shadows onto projection surfaces. It is recommended to use darker paint colors near screens (18% grey) to aid perception of image contrast. The spaces should be properly designed to have controlled lighting at projection and display locations. The control of ambient light with shades, blinds, etc., greatly impacts image contrast. (See related InfoComm standards.)

Figure 13.1
Optimum and acceptable viewing areas



LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 21 of 31

The following are acceptable types of projector surfaces.

5.6.1 Projection Screens



Motorized wall mounted or ceiling drop down motorized screens are recommended. Depending on space and function, tensioned or non-tensioned screen types may be used. Screen surface considerations such as material and screen gain will be considered based on room design and intended content requirement.

Consider sightline and audience viewability with projection screens. (Reference InfoComm AV Design Reference Manual for proper placement of screens.)

The off-centered placement of projection screens and writing surface next to screens, is recommended. This allows for simultaneous projection and writing without the need to raise and lower screens.

Multiple screens may be required based on room design, configuration(s) of classroom, discipline and intended tasks. A flexible space may have different requirements than a static space.

5.6.2 Dry Erase Paint



Use of commercial-grade writable surface paint, that cost effectively, turns any smooth surface into a high-performance dry-erase writing surface, such as Idea

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 22 of 31

Paint, in lieu of projection screen (combination of whiteboard and projection screen) may be considered.

5.6.3 Whiteboard



White board surface can be used as a projection surface in conjunction with Short/Ultra Short Throw projection when used for Interactive White Boarding functions.

5.7 Lecture Capture (Distance Learning)



Each smart classroom must have lecture capture capabilities, either fixed or portable, that provides the ability to record a presentation along with the synchronized corresponding audio in a format that can be redistributed via computer or other means to users outside the classroom.

The lecture capture system should be a simple one-touch process for recording and publishing. The system should have simple video management and organization for the distribution of content via various methods including mobile computing devices. The system shall be designed to be user friendly, easy to use and reliable. The core of the system includes hardware, software processing, management, distribution, and

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 23 of 31

archiving components. Also, AV interfaces should be provided in the spaces for portable based lecture capture systems.

Lecture capture system infrastructure shall be provided in all learning environments. Refer to LACCD AV Lecture Capture Standard for more information.

5.8 Videoconferencing



Some smart classrooms shall have videoconferencing capabilities that enable sharing across campuses, broadcast video of lectures to other locations, remote teaching, and desktop videoconferencing. Access ensures that professors and students are fully engaged and have complete access to the curriculum from anywhere. All colleges must be able to communicate face-to-face to share content and connect to each other, for unlimited programs with corporations, cultural institutions, science centers, and other knowledge centers. Dependent on room size, multiple video cameras may be considered.

Virtual server based, infrastructure future provisioning for videoconferencing will be recommended for each classroom.

Refer to LACCD Videoconferencing Endpoints Standard.

5.9 Document Camera

Document cameras are real-time image capture devices for displaying documents and objects in a classroom environment. They shall include high-resolution cameras that allows instructor to present on a sheet of paper or to display a two or three-dimensional object while the audience watches. Document cameras shall allow for connectivity to the room AV control system and output to video projectors, flat panel displays or interactive whiteboard. For portable document cameras, there shall be capabilities to connect to AV interface near teaching station.

Document cameras are desired for some disciplines such as Chemistry. For most

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 24 of 31

spaces, the portable type is recommended due to its flexibility. Ceiling installed document cameras may be best in areas that have fixed presentation areas. For classrooms where portable type is to be used, proper placement and quantity of AV input locations must be considered.

Documents cameras may be ceiling mounted, portable, fixed or platform types as shown below:

5.9.1 Ceiling Mounted or Recessed based



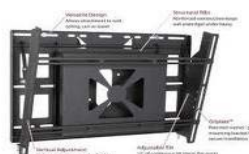
5.9.2 Portable units



5.9.3 Fixed or portable platform based



5.10 Flat Panel Displays (and Mounts)



Smart classrooms shall have provisions to accommodate high performance, commercial/professional grade, flat panel displays for primary viewing and/or support of instruction such as confidence monitors. Displays shall be sized appropriately for the

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 25 of 31

room as defined by industry standards for intended task levels, farthest viewer distance and minimum image height considerations. Off-axis viewing is also a consideration with regard to display size, number of displays needed and placement. Display size shall vary with classroom use (content to be displayed) and size. Displays must have the capabilities for multiple input types such as VGA, component, composite, DVI-D and HDMI.

Flat panel displays can also be used as primary display device, confidence displays or for augmented viewing in larger rooms. Refer to LACCD AV Flat Panel Display Standard.

5.11 Technology Furniture

5.11.1 Instructor's Teaching / Control Station

The instructor's lecterns should be designed with a view to a functional and clear operation of the AV equipment placed in the furnishings. Conduits and connections should be designed in a way that makes it easily accessible to all connectors meant for user access, while cables and fixed connections are hidden as far as possible.



The instructor teaching/ control station shall have the following features and capabilities (but not limited to):

- Allow instructor to effectively teach by maintaining eye contact with students seated at their computer desks. Consider height adjustable podiums where appropriate to meet teaching needs.
- Consider mobile/movable type lectern for flexible sightline.
- Depending on size and shape of classroom, connectivity on opposite sides of the classroom is preferred.
- Integrated control touch panel
- Integrated media interfaces
- Lockable storage area

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 26 of 31

- Telephone and/or help intercom
- Document Camera location (optional, based on discipline)
- Meet ADA (Americans with Disabilities Act), and Section 508 Rehabilitation Act of 1973, as amended.

It is recommended to design placement of AV, power and data floor and wall boxes in multiple locations to allow for maximum flexibility.

5.11.2 Student Workstation/ Desks



The student workstation /desk must have the following features and capabilities (but not limited to):

- Allow instructor to effectively teach by maintaining eye contact with students seated at computer desks
- The usable work space of desks shall be maximized and allow learning environments to have multiple uses.
- The computer furniture should have multiple inputs.
- Computer monitors must be secured to prevent theft.
- The computer furniture must be meet ADA (Americans with Disabilities Act) and Section 508 Rehabilitation Act of 1973, as amended.
- Computer furniture for special use such as the monitor/display concealment unit is recommended.
- All furniture is procured through campus relocation manager with Master agreement, catalog pricing.
- Refer to LACCD Computer Furniture Standard and applicable LACCD Procurement and Facilities standards.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 27 of 31

6. Section 6: Management and Support

6.1 Remote Resource Management System



The remote resource management system allows AV staff, operators and administrators simple and intuitive ways to centralize asset control, support, monitoring, management and maintenance of associated electronic devices in the learning spaces. Some of the functions are:

- Control AV resources
- Manage AV resources
- Monitor equipment status
- Proactive maintenance
- Sending of alert messages
- Schedule rooms and pre-configure equipment
- Track equipment usage statistics
- Asset management capabilities
- Asset security
- System energy management
- Reduce response time / IT efficiencies
- Generate system reports

Refer to LACCD AV Remote Resource Management System Standard for more information.

6.2 Digital Signage Systems

The LACCD digital signage system will be a fully networked, large-scale enterprise solution that is highly flexible, scalable, and allows for growth as requirements change over time. It will support all level of school officials, academic programs, sports and student organizations, promotions, postings and instant alerts of critical events and warnings. It will provide live TV, dynamic content delivery, asset management,

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 28 of 31

monitoring, control and reporting.

6.2.1 Campus-wide

- Security/Safety
- Wayfinding, interactive kiosks, directory/guidance, office hours, building maps, etc.
- Internal advertising and promotions
- Departmental information and events
- Scheduling information
- Student-organized events

6.2.2 Classroom enhancement

- With streaming, free-to-air TV channels can be broadcast to classrooms and individual student's PCs over the network
- Display classroom assignments
- Display lectures to augment regular classroom instruction

6.2.3 Instant Messaging/Paging

- Messages, updates and alerts shall be easily disseminated to students and teaching staff instantly.
- Ensures staff and students are up-to-date with latest information

7. Section 7: Professional Development & Training

Professional Development and training shall be offered at various levels of sophistication that will empower educators and end users to use their product solutions effectively to enhance their curriculum delivery and student outcomes. Professional Development offerings may include:

- Self-Instruction tutorials
- Live Webinars
- On-site training sessions
- Train-the-Trainer programs

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 29 of 31

IV. RELATED STANDARDS

The AV Smart Classroom Standard must be compliant with the related standards:

- LACCD Baseline Design Goals and Standards – Classrooms, Chapter 1, Room and Space Specific Goals and Standards, Category A, Classrooms
- LACCD IT Standards, IT Infrastructure Design Standards Std-01-030109
- LACCD IT Standards, IT Structure Cabling Systems Design Standards STD-02-030109
- LACCD Baseline Design Goals and Standards – CLASSROOM - MECHANICAL, ELECTRICAL, AND PLUMBING DESIGN CRITERIA – Electrical
- LACCD Baseline Design Goals and Standards – CLASSROOM - MECHANICAL, ELECTRICAL, AND PLUMBING DESIGN CRITERIA – Mechanical Systems (Ventilation, Temperature, Noise, etc.)
- LACCD IT Standards, Districtwide Data Center Design STD 03-0909.
- LACCD IT Standards, Identity Management Standard
- LACCD IT Standards, Applications Standard*
- LACCD IT Standards, Physical Security Standard*
- LACCD IT Standards, Virtual PC's Standard*
- LACCD IT Standards, AV Control and Automation System Standard
- LACCD IT Standards, AV Sound Amplification Standard
- LACCD IT Standards, AV Interactive Whiteboard Standard*
- LACCD IT Standards, AV Document Camera Standard
- LACCD IT Standards, Computer Furniture Standard
- LACCD IT Standards, Videoconferencing Standard - Endpoints

**These standards will be made available at a date and time to be determined by the District. Instructions on how to access these standards will be supplied at that time.*

V. EXCEPTIONS OR WAIVER REQUIREMENTS

Process

[insert process here]

Compliance

Failure to comply with the exception or waiver requirements and process will lead to *[insert]*

VI. REQUESTS FOR CLARIFICATION

A request for clarification on any of the standards listed above may be emailed to *[insert email address]*. In order to be considered, the request must include the following information:

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 30 of 31

- The specific standard number and title;
- What aspect of the standard needs clarification; and
- One or two solutions

VII. REFERENCES

- California Community College Space Planning Standards for Classroom, California Code of Regulations, Title 5: Education, Division 6: California Community Colleges, Chapter 8: Construction, Subchapter 1: Community College Construction Act
- The Americans with Disabilities Act (ADA), 1990, Section 508 of the Rehabilitation Act, as amended.

VIII. KEY TERMS & GLOSSARY

Key Terms

- **Must** means that the item or course of action is absolutely required.
- **Shall** means that the District intends that the supplier or consultant adhere to the instruction or command.
- **Will** means that the existing District systems or conditions require the item or course of action.
- **Optional** means that the consultant may choose to include or omit a particular item according to its preference. However, the item chosen must still interoperate or function with the District's existing systems.
- **Minimum of** means that the stated item or course of action meets the standard but may be superseded.

The following terms are defined as follows:

1. **Need** means that the item or course of action is essential and it will be absolutely required at the time indicated in the standard. (e.g. A high level risk assessment **needs** to be performed...)
2. **Call for** means that the item or course of action is absolutely required.
3. **Are to be provided** means that the item or course of action must be supplied in order to meet the standard.
4. **May be required if** means that if the condition stated in the standard is met, the capability, performance expectation, or any other description in the standard is absolutely required.
5. **Recommended** means that the course of action is in accordance with (Insert Applicable Area such as Security) Best Practices and should be adopted.

LACCD INFORMATION TECHNOLOGY STANDARD	Orig. Date: 01.29.10	Control No.: ITSTD-2010-01-SC
Title: AV SMART CLASSROOM	Rev. Date: 12.9.11	Rev. No.: R1
Technical Team: CFM Group	Approval:	Page 31 of 31

6. **Not Recommended** means that a course of action is not consistent with (Insert Applicable Area) Best Practices and/or other laws, codes, or requirements and should not be adopted.
7. **May/Might/Can** mean “optional.” The items specified using this language may be included or omitted depending upon the consultant’s preferences. However, even if one particular item is optional, the item chosen must still interoperate or function with the District’s existing systems.
8. **Preferred/encouraged** mean that one item or course of action is favored over other optional courses of action because of proven favorable outcomes.
9. **Acceptable** means that the item or course of action is only a minimum, and the consultant/ may supersede the quality or performance of that item or course of action.

IX. DOCUMENT HISTORY

REV # DATE	PAGE, PARA # CHANGE	DESCRIPTION OF CHANGE	APPROVAL SIGNATURE & DATE
R1/12.9.11	All	Smart Classroom Faculty Taskforce – comments, general revisions and updates.	DTC/ 12.9.11