

## Description of SmartLab Deliverables

This section describes the hardware, software, equipment and educational resources that Creative Learning Systems will provide in your SmartLab learning environments. Also in this section is a description of additional elements that are core to every SmartLab, and optional elements that have been selected specifically for Michigan Education Achievement Authority; as well as the information you requested on curriculum, alignment to standards, and core technological competencies directly addressed through SmartLab learning resources.

### Physical Layout

The SmartLab is comprised of flexible work-learn stations called “islands”. Each island is a collection of furniture and equipment, consisting of three workstations radiating from a ceiling-high, three-sided Power Pylon™. A typical island can accommodate up to six students at a time.

The Power Pylon distributes network data and electrical utilities to the three workstations through a system of quick-connect fittings. Power Pylons and workstations are arranged so the facilitator retains an unobstructed view of learner activities throughout the room. Each island workstation is readily detachable from the Power Pylon.

All workstations are constructed of rugged, high-quality metal structural elements, mounted on oversized locking rubber casters.

The SmartLab described in this Proposal is designed to provide a rich and diverse technology-based learning experience for classes of 30 - 36 students.

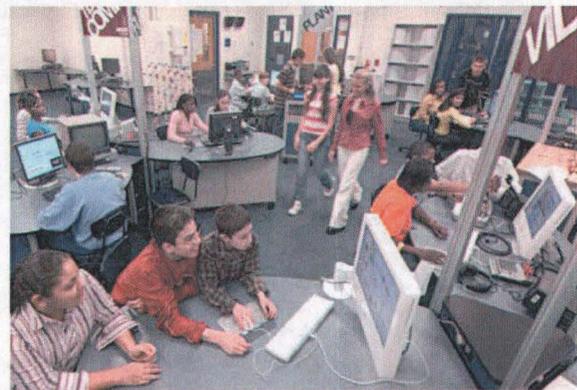


### General Description

#### ***Creative Learning SmartLab***

The SmartLab is richly-provisioned for advanced technology studies as well as general academics and career exploration.

SmartLab learning resources are organized around eight areas of core technological competency. These are: Alternative and Renewable Energy, Computer Graphics, Scientific Data and Analysis, Robotics and Control Technology, Circuitry, Software Engineering, Mechanics and Structures, and Digital Communications. Each of these core competencies is described below, along with the integrated systems of equipment, software, hardware and educational resources to support project-based, student-centered learning in those areas of study.



## ***Alternative and Renewable Energy***

Now your SmartLab students can explore one of the most exciting areas of emerging technology — ***Alternative Energy***. Alternative energy projects connect core academic content with 21st century skills through engaging, inquiry-based exploration. Students explore this exciting area technology with hands-on, minds-on activities connecting math, science, social studies and economics. Here are just some of the projects your students will explore:

### **Solar Energy Discovery Collection**

- Understanding photovoltaic cells
- Solar Energy and High Performance Homes
- Solar cooker design and testing
- Solar race car design and testing



### **Wind Power Discovery Collection**

- Understanding wind turbines
- Propeller blade design
- Wind farm design
- Storing Wind Power

### **Hydrogen Fuel Cell Discovery Collection**

- Electrolyzing water for hydrogen fuel
- Generating power from hydrogen fuel cells
- Design a hydrogen highway
- Hydrogen fuel cell race cars



The Alternative Energy Discovery Collection features twenty one of Creative Learning Systems' **Learning Launchers™** that cover the introduction to alternative and renewable energy, solar energy, wind energy, and hydrogen fuel cells. There are Learning Launchers at three different levels of difficulty to guide your learners through a variety of engaging activities with video tutorials, data collection worksheets, portfolio development suggestions and lots of ideas for extended exploration!

## ***Computer Graphics***

In Computer Graphics, students explore areas such as graphic arts, image capture, photo processing and manipulation, animation and special effects. They learn to distinguish between, and effectively use, bitmap graphics (digital “painting”), and object-oriented graphics (computer-aided “drawing” or “CAD”) applications. As learners progress, they integrate computer graphics with other software applications to create advanced graphic and commercial art, websites and multimedia presentations. Computer graphics also serves as an important portfolio development tool for documenting projects and learning processes.

Examples of computer graphics tools included in the SmartLab are:

- Adobe Photoshop and Illustrator Software Packages
- Desktop Mini-Studio with Lighting
- Digital Still Motion Cameras
- Doodle for Google Art Contest
- Flatbed Document Scanner
- Google Art Project
- Google SketchUp Software
- Photo Tripod
- Portable Lighting Studio
- Punch Professional 3D Home Design Software
- Tech-4-Learning Introductory Graphics software packages
- Curriculum and/or additional learning resources for all above listed items



### ***Scientific Data and Analysis***

In this system of technology, students collect experimental data using testing equipment and probeware, typically linked with a computer-controlled interface. Data is then analyzed to draw conclusions from experiments. Students engineer and test scale models and analyze materials and structure. Using chemical, physical and bioscience probeware, students collect and analyze experimental data to explore principles of science through hands-on, inquiry-based projects.

SmartLab scientific data and analysis tools include:

- Astronomy Experiences with MicroObservatory
- Extreme Weather and Monster Storms
- Global Information Systems with ArcGIS
- Global Information Systems with Google Maps, Worldmapper, NationalAtlas.gov, and the Welikia Project
- Laser Exploration Collection
- Microsoft Flight Simulator, USB Flight Yoke and Rudder Pedals
- Probeware for Measuring Light, Temperature, Movement, Voltage, Acidity of fluids and Human Physiology
- Probeware for the Study of Environmental Sciences to Integrate with Lego NXT
- SimCity Software
- Curriculum and/or additional learning resources for all above listed items

### ***Robotics and Control Technology***

In this area of study, mechanical processes are managed through automation control interfaces and learners design and program robotic systems to perform task-oriented challenges. Students explore logical programming and explore how sensors, electronic and computer controllers are used to manage complex mechanical processes. The concept of sense, decide, and act is introduced and students develop whole-systems perspectives.



SmartLab robotics and control technology resources include:

- fischertechnik Control System
- Lego NXT Control System with Software
- Curriculum and/or additional learning resources for all above listed items
- All control/robotic systems delivered as construction sets are provisioned to accommodate multiple classes so projects do not have to be deconstructed each class period.

### ***Circuitry***

The study of circuitry is explored through electricity, pneumatics and microelectronics. Students develop an understanding of the scientific and technological principles underlying each of these systems. With this foundation, students design complex systems utilizing each technology.



SmartLab resources for the study of circuitry include:

- Pneumatics System with Component Attachment Platform, Pneumatic Service Module, and Portable Silent Compressor
- Snap Circuits Electricity Exploration Collection with Multimeter
- Curriculum and/or additional learning resources for all above listed items

## Digital Communications

Engagements in the Digital Communications system provides new experience and reinforces the ability to communicate effectively utilizing single, blended, and advanced media. Digital Communications encompasses the capture and production of content in any single media, such as print, sound or electronic media. It includes word processing, presentations, and graphic representation of data or processes in the form of flowcharts, tables and graphs. It also includes the capture, production and presentation of single-media content such as audio, video and digital still images. Learners quickly progress from developing core competencies in these areas to the regular application of these tools to document their learning throughout the SmartLab. Also, learners develop advanced communications skills through the integration of two or more media using technology-based tools. Students explore linear and interactive presentations and the applications for each. Learners progress from basic to more advanced software and production tools, creating dynamic video presentations, animated graphics, websites and interactive e-portfolios. As with all documentation and presentation applications in the SmartLab, the emphasis quickly shifts from developing necessary skills to the application of the technology for portfolio development and presentation of learning.



Digital communications resources include:

- Adobe InDesign Software Packages
- Adobe Dreamweaver and Flash Studio Web Software Packages
- Tech-4-Learning Claymation Animation Kit and Frames Stop Motion Software Packages
- Camtasia Software
- Crazy Talk Animator Pro
- Crazy Talk Software Packages
- Digital Cameras
- DVD/CD Creation and Labeling Kit
- Flatbed Document Scanner
- Google Sites Software for ePortfolio Creation
- Inspiration Software
- Microsoft Office Software Suite – class license
- Photo Tripod
- Portable Lighting Studio
- Professional Quality SD Card Compatible Camcorder
- Royalty Free Audio Clips including Music Beds and Sound Effects
- Royalty Free Video Clips
- Sony Acid Looping Audio Creation Software with the Sound Engineering Collection
- Sony Vegas Video Post Production Software Packages
- Power Production Storyboarding Software Packages
- Super Arm Camera Clamping Systems, Video Tripod, and Dolly
- STEM Career Exploration
- Timeliner Software
- USB Microphone and Stand
- Video Accessory Collection including Studio and Lavalier Microphones
- Video Production Keyboards
- Curriculum and/or additional learning resources for all above listed items



## **Software Engineering**

In this area of study, students learn to create mobile and computer desktop applications. Initially in their experience, students create interactive online greeting cards, and computer animations. They simulate real systems and processes, and even create basic computer games. Later students have the opportunity to create real desktop and mobile app games that they can eventually publish and sell.



Software engineering resources include:

- App Inventor Software
- Microsoft Kodu Game Development Software
- MIT Scratch Version 2 Software
- Stencyl Software
- Touch Develop Software
- Curriculum and/or additional learning resources for all above listed items

## **Mechanics and Structures**

In Mechanical Systems, learners create and study structures and machines. Hands-on learning engagements foster an understanding of simple and complex machines and structural physics.

Mechanics and structures construction sets include:

- fischertechnik Mechanisms and Structures Kits
- K'nex Construction Sets
- West Point Bridge Designer
- Zometool Geodesic Structuring and Interdisciplinary Learning System
- Zometool System Modeling Software
- Zoob Construction System for Rapid Visualization and Prototyping
- Curriculum and/or additional learning resources for all above listed items
- All mechanics and structures collections delivered as construction sets are provisioned to accommodate multiple classes so projects do not have to be deconstructed each class period.



## **Additional Elements**

### **Facilitation Zone™**

The Facilitation Zone provides a dedicated work area for SmartLab Facilitators. It is designed and provisioned to support SmartLab management, student guidance and assessment, provide critical professional resources and enable ongoing technical support.

The Facilitation Zone includes a storage systems, a custom designed work/learn station with a LCD monitor arm, a collection of professional-development resources, learner-facilitation aids, application software packages, and systems for remote-connection to software-support and facilitator-support services provided by Creative Learning Systems.



### **SmartLab File Server**

The server is the heart of the SmartLab network. Creative Learning Systems technicians carefully develop system specifications and then custom configure each Server to assure stability, functionality, and supportability for each SmartLab learning environment.



### **SmartLab Media/Systems Integration Services**

Creative Learning Systems technicians carefully develop system specifications and then work with your technology team to assure stability, functionality, and supportability for each SmartLab learning environment. Our technicians collaborate with your technicians to specify hardware, establish the proper security over specified shares, upload over one hundred gigabytes of resource data to be utilized by facilitators and students, establish the client workstation base image, install the environment's software, and establish a cohesive redundancy strategy.

### **Replication Platform™**



The Replication Platform houses and distributes power and data to black/white/grayscale laser, and color laser printer devices. Each printer is fully-networked, enabling learners and facilitators to access to any printer from any computer workstation.



### **Video Production Workstations - (2 included in SmartLab)**

The Video Production Workstation allows learners to shoot and edit broadcast quality video. The computer workstation specified in this Proposal will allow for at least ten hours of video storage. The secure digital high capacity (SDHC) is perfect for novice learners. The system also includes video editing software, video DVD creation software, and professional microphones.



Major equipment and software provided include:

- Professional quality digital video camera and accessories collection
- Tripod and dolly for camera
- Flexible camera holding arm with clamp
- Video editing systems
- Professional microphones
- Cables to connect all equipment provided

### **Advanced Exploration Collection**



The Advanced Exploration Collection features a wide range of learning resources to facilitate the study of core competencies in greater depth. It provides additional challenges for learners with advance capabilities or those who spend multiple semesters in the SmartLab environment. These resources allow learners to tackle increasingly advanced projects and create sophisticated portfolios of their work.

With this collection, learners utilize resources that feature familiar elements, but are also more complex than the systems they previously experienced.

Advanced experiences include integration of physical simulations with computer-controlled interfaces and point-and-click programming languages, microelectronics, prototype development, bio-related technology, team-effectiveness training, advanced graphic design, 3D modeling/animation, project development and more.

Major equipment and software in the Advanced Exploration Collection includes:

- Professional quality SDHC compatible camcorder
- fischertechnik control systems
- Laser exploration collection
- Microsoft Flight Simulator, USB flight yoke and rudder pedals
- Punch Professional 3D home design software
- SimCity software
- Sony Vegas video post-production software packages
- Power Production storyboarding software packages
- Probeware to integrate with Lego NXT for the study of environmental sciences
- Sound Engineering Collection to include powered speakers, headphones, M-box MIDI processor, MIDI keyboard, studio microphone, and software suite for looping, sequencing, notation, and sound mastering software.
- Super arm camera clamping systems, video tripod, and dolly
- Video Accessory Collection including studio and lavalier microphones
- Video production keyboard
- Zometool geodesic structuring and interdisciplinary learning system
- Zometool system modeling software

#### ***Presentation/Collaboration Collection with a LCD Projector***

This collection includes a ceiling mounted LCD projector, custom cabling, professional audio system, and a customer supplied screen. The collection is also provisioned with a turnkey suite of software and learning media.

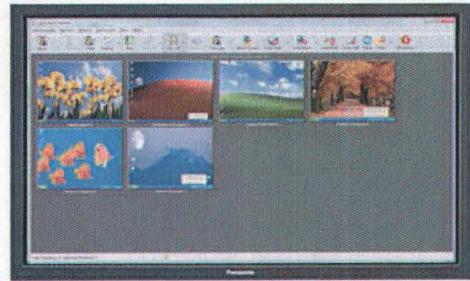
Here, groups of SmartLab learners can make or view presentations, and engage in focused discussions and creative team brainstorming. SmartLab Facilitators can use the collection for class meetings, and to provide direction and instruction to learners.



Ten (10) rectangular flip top activity platforms are also included. These may be arranged in multiple configurations so small teams, work groups, or whole classes of learners can meet and engage in presentations and direct instruction.

### **Computer Control Monitoring System with a 70" LED Display**

Facilitators in technology classrooms today are faced with the challenge and opportunity of using technology to teach. Computers are amazing educational tools, but they can also be a huge distraction to learning. The Internet, instant messaging, email and games are a constant temptation for students.



The computer control monitoring system removes these distractions so the facilitator can have a powerful tool to help keep students on task. No classroom management solution is easier to use or better suited for teaching in a 21st century classroom.

Teachers can reduce student distractions by blanking screens, limiting applications and limiting web browsing on student computers. This helps direct student attention from their computer to the teacher and keeps students on task.

Ideal for monitoring student activity within a classroom or lab setting, the thumbnail feature allows you to view all screens as well as see the current application and website that the students are running. Teachers can send messages to all or individual students.

Students can silently request help from the teacher. A small question mark appears on the thumbnail with the student question, which indicates they need help.

This collection includes a wall mounted seventy inch LED display, custom cabling, and professional audio system. The collection is also provisioned with a turnkey suite of software and learning media.

Here, groups of SmartLab learners can make or view presentations, and engage in focused discussions and creative team brainstorms. SmartLab Facilitators can use the collection for class meetings, and to provide direction and instruction to learners.

### **Construction Set Storage System with Replacement Construction Sets for Each Class Period**

A wire-frame rack system houses construction kits provisioned for each class period. The system allows a designated storage space for each construction set. The construction sets include:

- fischertechnik Computing control technology collections (quantity varies per school)
- fischertechnik Profi Mechanics and Statics Motorized Mechanisms collection (quantity varies per school)
- K'nex Colossal Building Collections (quantity varies per school)
- Lego NXT Mindstorms control technology collections (quantity varies per school)
- Solar Energy Automotive Building Collection (quantity varies per school)
- Zome Mathematical Structuring Collections (quantity varies per school)
- Hydrogen Car Construction Collections (quantity varies per school)



### **Elementary Layer – Bethune Only**



The Elementary Layer allows for classes of second - fifth grade students to have initiatory experiences in the SmartLab. This collection of curriculum, assessment, software, equipment and construction sets is fully articulated with the middle school experience. The system is based on twenty



Lift-Off Challenges in the systems of Computer Graphics, Science and Data Acquisition, Robotics and Control Technology, Mechanics and Structures, and Multimedia/Publishing. Whole class activities are also provisioned for grades two and three in the systems of Science and Data Acquisition, and Computer Graphics. Resources include:

- K'nex Collection with storage systems (3 ea)
- Drawing/painting tablet
- Elementary banner collection
- Headphones (30 ea)
- Lego WeDo elementary robotics system with software (3 ea)
- Lego WeDo resource collection (3 ea)
- Pixie painting/storytelling software (16 ea)
- Snap Circuit elementary collection (3 ea)
- Timeliner XE software (16 ea)
- Vernier elementary science collection and control software and storage system (3 ea)
- Vernier GO Temp experiment book
- Vernier GO Temp temperature collection (16 ea)
- Vernier science mitten and cup making accessory collection (3 ea)
- USB Microphones (2 ea)
- Zometool naked creator kit III (3 ea)
- Zometool creativity spare parts collection with storage system



### **LCD Monitor Arms**

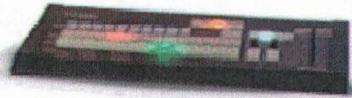
Due to the wide range of activity that takes place in the SmartLab, CLS supplied furniture must be flexible and accommodate any activity or seating configuration that may be necessary. The picture to the right shows a VESA compatible LCD monitor attached to a CLS supplied monitor arm. The monitor below has attached speakers so the desktop surface is kept completely free from non-essential devices.



Notice the students have plenty of room to spread out curriculum and peripherals because the LCD monitor with attached sound bar does not take up any desk space. Another advantage of this configuration allows students to sit anywhere around the furniture they desire because the LCD monitor will simply move to any angle and height for optimal viewing.

## Mobile Video Console – Pershing Only

The Mobile Live Edit Video Console allows learners to document events and create original video productions in a dynamic and exciting way. It features professional-grade production equipment integrated in a portable, easy-to-operate system. The heart of the system is a Tricaster editing device that allows for analog input from multiple devices. Any of these signals, whether in single or multiple formats, can be digitally mixed. The system enables output in either DV or analog format.



Inputs consist of two professional-quality video cameras, a video bank (integrated with the Tricaster), and/or a computer. Each of the inputs may be previewed on the LCD monitor array.

Output devices consist of a video bank integrated with the Tricaster, a computer, and the streaming capability of the Tricaster that will convert a video signal to a live, closed-circuit internet broadcast. The video bank is unique in that it does not require removable media; it features a very fast internal hard drive, allowing for digital storage of live video. Later, the stored video can be played to a post-production device such as the computer workstation included with the system.

Learners can capture live video sessions so it can be played later, transferred to DVD media, or simply archived. Conversion to Internet compatible formats is also managed through the system, allowing webcasts of either live or pre-recorded, high-quality video to school community members both inside and outside of the school.



Live video can be previewed from the output of the mixer on the monitor array. A professional-grade audio system, including powered desktop speakers and stands, is also included. The system configuration allows for simultaneous amplification of all audio input devices through the integrated speakers.

The system is housed on a workstation that includes rugged oversized casters and surge protected power services. This workstation also features an integrated CPU shelf for mounting computer hardware. The top platform accommodates three arm-mounted, 24 inch wide 16:9 format LCD flat panel displays, powered speakers, the Tricaster, the Tricaster switching control surface, and video production keyboard. Everything on the Mobile Video Live Edit Console is securely mounted, allowing learners to freely wheel the system around the school without risk of injury or damaging equipment.



In addition, two professional-quality P2 cameras are securely mounted on wheeled tripods providing similar ease of mobility. Also included in is a custom-designed teleprompting system that will allow learners to read a script directly from a teleprompting system mounted on a tripod. Used in tandem, a professional presentation equal to news broadcasts done on mainstream television stations can be produced. The teleprompting system is linked to the computer on the Live Edit Console. Easy to use software allows



learners to write scripts for newscasts, announcements and other broadcast productions.

A professional computer is connected to the system through a firewire cable connection and an Ethernet connection to the Tricaster.

Learners can use the Mobile Video Console to document school projects and create compelling video presentations. For example, learners could utilize the system to broadcast a news item on school funding from the front of the state capital building, or a robotic Mars rover navigating the surface of the red planet. Such sophisticated effects are easily accomplished through the integrated mixer, dual professional-grade cameras and chroma-key editing features designed into the system.



Similarly, this advanced production system offers many applications for other classes and activities. Examples are as extensive as they are varied. A group of history students may recreate a civil war battle using authentic backdrops. A math student could illustrate a lesson on fractions while standing in front of visual aids, similar to a TV weatherperson. Science students can create a video demonstration of proper dissection techniques. A video-production club could create an informational video about the school. The yearbook staff can create video

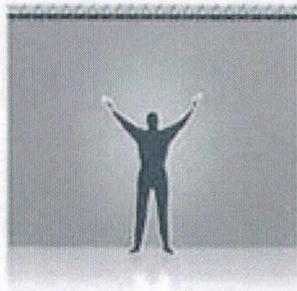
supplements published to CD or the web. The football team can produce a highlight reel to commemorate a successful season. And, because the entire system is designed around a mobile platform, it can be moved to classrooms to film guest lecturers, the auditorium to record drama presentations and graduation proceedings, or the school gymnasium to broadcast live sporting events.

Teachers may also use the system to create engaging video presentations to supplement regular lessons. Professional development presentations integrating text and graphics are easily produced. Communications of administrative matters can be recorded or broadcast live to the school community.

Many schools also utilize such systems to present video-based announcements. A newscast format creates an especially engaging presentation. The system's ability to easily generate transitions, fades, and other special effects during a live production, allows such presentations to be created in an attractive, professional manner.

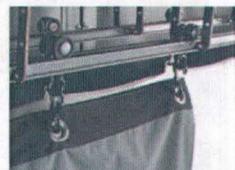
The system may also be made available to assist the general community. Students may use the system to create advertisements for businesses, produce public service announcements, or create video Christmas cards to raise money for charitable causes.

### ***Reflecmedia Curtain System***



The Reflecmedia Chroma Matte Curtain is fully-integrated with the Mobile Video Console, allowing simple, "on-the-fly" creation of chroma-key virtual sets and backdrops. This technology enables learners to enhance video productions by blending video images of, for example, live presenters or scale models, onto virtual backdrops appropriate to their projects.

The camera and another video device such as pre-recorded video or still motion images from the Tricaster provide the input for these special effects. The Tricaster allows learners to easily create these engaging and professional effects. The blended



images can be captured for storage, broadcast and/or post-production editing.

A Reflecmedia curtain integrates newly-introduced technology. Students now have access to an easier to use chroma-key system. This is accomplished through an economical, reflective gray curtain, matching LED light ring that attaches to the camera, and integrated technology to digitally "erase" the studio curtain, substituting sets and backdrops limited only by the learner's imagination. This new technology also offers other advantages over the traditional cyclical wall; background and subject lighting requirements are minimal, and the screen requires less maintenance than the installed cyclical wall.



The Reflecmedia Curtain System includes a camera-mounted, dual blue/green LED light ring and the compatible reflective ChromaFlex curtain.

Any situation that requires a virtual set can be produced with Chroma-Key Video Editing. For example, a news report on school funding can be presented from the state capitol; a presentation on buoyancy can be presented from under the ocean; an operating scale model of a lunar rover can be demonstrated from the surface of the moon. Possible applications for this technology are limited only by the parameters of a given project and the creative energy of the producers.

### **Confidence Monitor**

This collection includes a forty inch LCD display, custom cabling, and mobile cart. The LCD display allows for the talent in the studio to have a feedback monitor so they can see themselves live and they know where they are pointing on a live virtual set.



### **Portable Chroma-Key Virtual Set System**

The Portable Chroma-Key Virtual Set System is fully-integrated with the Mobile Video Production System, allowing simple, "on-the-fly" creation of chroma-key virtual sets and backdrops. This technology enables learners to enhance video productions by blending video images of, for example, live presenters or scale models, onto virtual backdrops appropriate to their projects. Two cameras - or alternatively, another video device such as pre-recorded video or still motion images from the Tricaster 40 provide the input for these special effects. The Tricaster 40 allows learners to easily create these engaging and professional effects. The blended images can be captured for storage, broadcast and/or post-production editing.

The Portable Chroma-Key Virtual Set System described in this proposal integrates newly-introduced technology to dramatically reduce both the cost and complexity of this process. This is accomplished through an economical, reflective gray studio flex screen, a matching LED light ring that attaches to the camera, and integrated technology to digitally "erase" the studio curtain, substituting sets and backdrops limited only by the learner's imagination. This new technology also offers other significant advantages over traditional systems; background and subject lighting requirements are minimal, and the screen requires less maintenance than an installed cyclical wall.



### **Portable Studio Lighting**



Portable lighting is accomplished with two 24x32" and one 12x36" silver interior soft boxes, tilt brackets, an accent light or hair light, 50, 30 and 20 watt screw-in fluorescent bulbs, boom arm, stands and wheeled case. Learners will be able to set up the perfect lighting situation wherever they desire to create the perfect shoot.

### ***Professional Development***

Facilitator training and professional development is a critical element in the success of the SmartLab environment. As such, it is included as an integral element of this Proposal. Creative Learning Systems provides a total of four (4) days of on-site facilitator training for the MEAA facilitators as a group and one additional day in each environment one on one with each facilitator.

Two (2) days are provided for the Mobile Video Console (Pershing only). This training and development program is intended for those educators who will be directly involved in the day-to-day activities in the SmartLab (including up to four educators designated as alternate SmartLab facilitators).



Technical concepts as well as good facilitation techniques will be discussed and practiced.



In addition to the initial professional development sessions, one tuition slot to the Creative Learning Systems annual facilitator conference, AFDC (Advanced Facilitator Development Conference), is included in this Proposal. Subsequent and additional registrations may be purchased at a discount rate under our curriculum & support agreement.



*“Students who typically struggle suddenly become engaged. Mid-level students start pursuing more challenging work - and our high achievers? They soar.”*

*Dennis Gable  
Teacher, Elkhart Central High School IN*