

Flat Screen TVs vs. Projectors

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Executive Summary

The Washington Unified School District serves the city of West Sacramento, a city that covers a 23-square mile area in eastern Yolo County, along the west bank of the Sacramento River, just south of where it meets the American River. The district serves an ethnically diverse and growing population of 7,494 students, with a staff of 411 certificated and 311 classified employees. Currently there are seven elementary schools (one K-5 school and six K-8 schools), a comprehensive high school, with an independent study program, and an alternative program.

In addition to a quality K-12 educational program, the district offers a variety of additional educational opportunities to meet the needs of the student population, including preschool programs, English as a second language/bilingual education, special education, a GATE program, vocal and instrumental music, an AVID program, an opportunity program, adult education, independent study, and Career and Technical Education.

The district was established in the 1950s and the majority of the facilities represent the architecture of this time period although modernization for environmental improvements has occurred over the past 30 years. As the district moves toward 21st century learning that includes a reliance upon integration of technology, the antiquated design of the classroom footprint the creates challenges. Of these, the most challenging is the ability to project teacher and student materials in a safe manner that is responsive to the changing instructional environment as we shift toward student-centered Common Core lessons that incorporate 21st century skills. This study seeks to describe the options available to meet this instructional need within the existing classroom facilities as well as set an industry standard as new classrooms and school are built within the district.

Background

Most of the nine campuses in Washington Unified were built in the 1950s with upgrades for modernization performed over the course of the last 30 years. There are three campuses that have been built within the last 16 years and include a projection system that is safe due to the method in which they are mounted, but do lack the interactive component. Below is a breakdown by projection method and school site:

- Ceiling mounted Epson Powerlite projector and Extron system that allows switching between a laptop, Elmo, and DVD player which is projected on a screen that covers the white board in the front of the room. Requires device to be “tethered” to control box via HDMI or VGA.
 - River City High School - 9-12 (built in 2009)
 - Bridgeway Island Elementary - K-8 (built in 2001)
 - Stonegate Elementary K-8 (built in 2008)
 - Bryte Culinary Arts School (built in 1950s, but fully modernized in 2015)

- “Teaching wall” design that is comprised of a short-throw, interactive Epson projector and Extron system. Due to lack of training on the technology and pedagogy, the interactive feature (similar to SmartBoard) is under utilized and most teachers use the projector in a traditional format. Requires device to be “tethered” to control box via HDMI or VGA.
 - Riverbank Elementary - K-8 (built in 1960, but wi-fi and modernization added in 2008)

- Epson Powerlite projectors placed on tables next to a laptop and an Elmo document camera. Because of the age of the buildings, the classrooms on the older campuses cannot have ceiling mounted projectors because of the ceiling mounted vintage duct work. Depending upon the location of the duct work, short-throw projects are a possible solution, depending upon the classroom. Finally, the power cords for the technology (projector, document camera, and laptop) create a safety hazard that is not entirely alleviated using large rugs to cover the cords to avoid tripping. Requires device to be “tethered” to control box via HDMI or VGA.
 - Westfield Elementary (built in 1954)
 - Southport Elementary - K-8 (built in 1999)
 - Westmore Oaks Elementary - K-8 (built in 1953)
 - Alyce Norman Preschool (built in 1959)
 - Yolo Education Center (built in 1957)
 - Elkhorn Village Elementary - K-8 (built in 1951)

In August 2015, wireless was completed district-wide, creating an environment that supports mobile devices. The district started deploying Chromebook and Windows 8 laptops and tablets in April 2015 and to date has over 2,000 student devices on the wireless network, with 1,500 to 2,000 being added in subsequent years. This increase in access for students paired with comprehensive professional development focused on technology integration where teachers are learning to integrate technology into student-centered activities as opposed to a more traditional direct instruction methodology. The

shift in instruction requires opportunities for students to present and explain work to their teacher and peers, however none of the current systems allow a true interactive experience through a wireless environment.

This study will explore the two options available for providing a display that is interactive and supports the 21st century skills that are found in the Common Core standards and represent a student-centered, flexible classroom environment. For the purposes of this document, interactive will be defined as both students and teachers having the ability to project the screen from their mobile device (i.e. Chromebook) to a larger display for classroom presentations and explanations. Chromeboxes are being considered to provide this interactive component for newer Epson Powerlite projectors and flat screen televisions. Given the limitations of the older classroom facilities, options beyond the traditional mounted projector are necessary for consideration and the alternative being considered is a large, flat screen television on a stand with a Chromebox for interactivity. The Total Cost of Ownership (TCO) study considers all direct and indirect costs which is critical at this juncture as existing classrooms are updated and new classrooms and schools are being planned and a new industry standard for classrooms will be set.

The first priority will be to provide an option for the oldest school sites (Westfield, Elkhorn, Southport, and Yolo) in which cables and cords clutter the floor and create a tripping hazard. In determining which classrooms will receive a large, flat screen TV to pilot, the following will be considered:

- Age of current Epson Powerlite projector
- Size of the classroom footprint and existing layout (windows, doorways, countertops, cabinetry, etc.)
- Access to mobile devices (Is the teacher part of the “Innovative Educator” 1:1 program and has a Chromebook cart housed in their room?)
- Willingness of teacher to shift pedagogy and instructional design to incorporate flexible, interactive lessons, receive additional training, and provide evaluative feedback

Known and Standard TCO Components

The following are the known and standard TCO components associated with transitioning to flat screen televisions for interactive display:

- Hardware acquisition cost
- Software Licensing cost
- Network/Internet connectivity cost
- Initial Deployment cost
- On-going deployment costs
- End-user training costs

Challenges and Unknowns

- Effectiveness and efficiency of Chromebox to provide interactive component - The teacher and students will need to “remote into” the Chromebox to share their screen. Will this be too many additional steps or can this process be absorbed into classroom procedures? If a student does not log out of the Chromebox, will this create security issues?
- Network bandwidth - Can the existing wireless network support interactiveness quickly enough as to not be an obstacle?
- Security of equipment - Theft of the large flat screen TVs is a large concern as we have had a number of our school sites burglarized in the past, especially in the neighborhoods where this equipment will be placed. The equipment will be desirable and usable outside the school network which could lend itself to more break ins. Security systems at the school sites are not consistent and in the past, police have not been quick to respond because of so many false alarms.
- Quality of projection - Will it be difficult for students to see the content on the screen from the back of the room? Will the rooms be too bright to be able to display the content effectively? Will the quality of the image on the television screen be sufficient?
- Safety of flat screen on stand - In order to provide the greatest safety for the large equipment, a large sturdy stand will be required. Will the footprint of the stand be too large for our smaller classrooms? Will the stand create a tripping hazard of it’s own? How stable will the setup of the flat screen on the stand be in terms of tipping?
- Repair and servicing of the televisions - If there is damage to the flat screen television, is there a local repair or will it need to be sent/shipped for repairs?
- Vandalism by students - How will the students respond to the new equipment? Will they respect it and not vandalize, or will it become something else in the classroom that can be destroyed?
- Change in instruction - What impact will the interactive capabilities be on instructional design and student achievement? Will teachers truly embrace the technology and redefine instructional practices to include this technology?

Comparison

Based on estimated costs over a five year time frame

| | Flat Screen Television w/ Chromebox | Notes | Epson Powerlite Projector w/ Chromebox | Notes |
|---------------------------------|--|-----------------------|---|------------------|
| Equipment cost | \$300,000 | 200 classrooms | \$440,000 | 200 classrooms |
| Warranties for equipment | \$50,000 | 200 5-year warranties | --- | Included in cost |

| | | | | |
|--|-----------|--|-------------|--|
| Chromebox w/ keyboard and mouse | \$60,000 | 200 classrooms | -- | N/A |
| Licensing for Chromebox | \$6000 | 200 classrooms | -- | N/A |
| Stand | \$160,000 | 200 classrooms | -- | N/A |
| Extron system | -- | N/A | \$2,000,000 | Cabling and installation of wall unit for switching inputs |
| Bulbs | -- | N/A | \$400,000 | |
| Support Staff Time | \$20,000 | 2 hours for testing and setup, support per classroom | -- | Setup performed by outside vendor |
| Training | \$20,000 | 2 hours PD per teacher | \$80,000 | Vendor provided training, follow up hours of ed tech PD |
| Totals | \$616,000 | | \$2,924,000 | |

Findings

- At first glance, the total cost (direct and indirect) for installing flat screen televisions in 200 classrooms over the course of 5 years is significantly less expensive than Epson Interactive projectors with the Extron system. The total savings is \$2,308,000 over the five years. The Total Cost of Ownership (TCO) for the Epson solution \$588,400 is and the television solution is \$123,200 per year.
- The most significant cost for the Epson Interactive projectors is the installation of the Extron system. This is provided by an outside vendor and is the industry standard for installing projectors in the district.
- In order to maximize the use of the interactive features with the Epson Interactive projection system, staff will need to be trained on the Epson software and how that integrates with Chromebooks. Past history demonstrates that this will need to be ongoing, annual training in order to best utilize this feature, which increases the cost for training substantially.
- The cost for training per classroom for flat screen television is significantly less because the depth of training is not as complex. In this solution, the technology (television and Chromebox) will not be a barrier to usage.

Conclusion

From a Total Cost of Ownership (TCO) perspective, installing flat screen televisions with Chromeboxes for interactivity solution presents the most cost effective option. It is recommended that the district pilot flat screen televisions with Chromeboxes in selected Innovative Educator classrooms to gather feedback and to evaluate the instructional appropriateness. If positive, then prioritize the deployment of additional television/Chromeboxes based upon the greatest need for safety and willingness of the teacher to accept the technology.