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**CAMPUS
TECHNOLOGY**

EDUCATION LEADERS ON...

Making the Case for High-Quality Projectors on Your Campus



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INTRODUCTION:

The technological advancements of projectors and projection systems has grown exponentially. When compared to consumer adoption rates of high-quality audio-visual tools, however, colleges and universities fall behind. What advantages are many institutions missing out on? How can these advanced projectors influence learning outcomes? Campus Technology spoke with 5 universities and audio-visual solutions provider Canon to gain their insights.

MEET THE CONTRIBUTORS



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1. What features of an HD projector are important when showing intricate, highly-detailed visual content in class? When relating intricately-detailed visual content during class, what features of an HD-quality projector do you consider vital in effectively improving a student's understanding of the course material? Please also share any results, anecdotal or otherwise, that support your opinion.

GRAHAM BOUTON: Brightness and a high contrast ratio are essential to any classroom-based HD projector. Many of our classrooms provide less-than-ideal ambient lighting conditions that can induce glare and washout. A HD projector should be optimized to deliver crisp black text from all viewing angles in the room with all of the lights on. Students take notes, and they also bring their own laptops, smartphones and tablets. With those devices already competing for their attention during class, they won't pay attention to a projected image if it's not clearly presented and of high quality.

BRIAN FORD: In my opinion, when dealing with intricately-detailed visual content during class, two key features of a HD-quality projector that are vital for understanding course material are screen resolution and contrast ratio. One example of this would be in an art classroom for a photography class. The higher max resolution that is typically offered by a HD projector helps improve the image quality of a high resolution image. The contrast ratio is also crucial, since it can dramatically affect the appearance of the darker and lighter colors of an image, when in comparison to the original image.

TIM KIRK: In my tenure at South Arkansas Community College, I have seen our biology classes evolve from students taking turns at microscopes to students huddled around TV displays to students sitting in well-lit classrooms as their faculty displayed a variety of images and have augmented their lectures with mark up and multiple display technologies. Other students reviewing radiologic films and other medical transparencies or liberal arts students studying the nuances of art or film without the loss of definition or color that was the norm just a few years ago.

MELINDA KRAFT: Image brightness is always a concern. In some spaces the ambient lighting can be very high and turning off classroom lights is not always practical. In our science buildings, for example, we have lab spaces equipped with projection systems. We can't always safely turn off the lights while students are conducting experiments.

Accurate color is also very important. It is a constant struggle for us in the Arts when the projected image colors don't match the monitor image, or in many cases, a professor's opinion of how they should look. While we may not ever get there within our budget, the ultimate expectation of faculty and students is for a projection-sized image with HDTV quality.

GAIL RICHTER-NELSON: Screen Size, Screen Size, Screen Size!!! Or at the least...perhaps a zoom?

Most classrooms and conference rooms now have "new" digital displays that are about a quarter of the size of the projection screens that they replaced. It is funny to me to see pull down screens idle in a room next to the new "digital displays" that seem like postage stamps compared to the image size available if a projector were used with a pull down screen. Even the text of a PowerPoint is hard to read, much less intricate illustrative details. HD projectors make much more sense.

Anyone who has designed rooms for visual image projection knows the ratios needed for readable display. Somehow the "large TV/computer screen" suppliers have managed to convince facility designers that a lot of little screens would suffice. Doesn't work that way, but rooms are filled with them.

TECHNOLOGY INSIGHT FROM CANON: The projected image has to be as bright and clear as possible regardless of screen size or ambient light levels. Color accuracy is important, too, and can be critical in some courses, including the arts and sciences. To achieve these “highest standards,” technology should be optimized in terms of projection systems, lenses, and color management. For example, the proprietary Aspectual Illumination System (AISYS) used in our REALiS LCOS projectors features a sophisticated optical array, including a specially designed Polarization Beam Splitter (PBS) to minimize light leakage and enhance contrast. As a result, colors stay true to the source image and projection remains powerfully bright. The evolution of HD (and better) quality is not simply about going to the next level. It is about appealing to the human eye and the attention/retention factors, much as “HD-quality music” appeals to the average listener.

2. High quality A/V tools, such as LCOS projectors and advanced cameras and camcorders, are an essential part of learning in today’s visually-oriented society. What kind of impact do you think these A/V tools potentially have on learning?

BOUTON: These types of A/V tools are only as good as the content they are being used to capture and display. But well-developed course material that is also presented and captured by a lecture recording system with high-quality components is capable of improving the learning experience by allowing students to tailor viewing to their own pace and needs. Being able to provide students with the opportunity to review specific sections of challenging course material is just one example of how these tools can provide a positive learning impact, even in traditional lecture-style courses.

FORD: Higher quality A/V tools are an essential part of learning, because they help produce more life-like images, when in comparison to the technology that preceded it. This is especially apparent when displaying a high resolution image through a LCOS projector, or when using a DSLR camera to take a picture. These tools give us a quality image much closer to that of the naked eye, than what we have been able to achieve previously.

KIRK: As a two-year school in southern Arkansas, we are in the process of starting a media design program. This would have not been possible just a few years ago with the high cost of cameras, camcorders, and processing equipment. The digital revolution of the past decade has permitted us to offer a range of courses that would have been prohibitively expensive. It has further permitted our students to compete nationally with students not only at other two-year institutions but also at more liberally funded four-year schools as well.

KRAFT: Faculty who rely on PowerPoint with text and web-quality graphics, YouTube videos, etc., are not going to recognize any impact on learning from a high-end projection system over a standard analog system. For HD to be essential, we have to get our content creators trained to leverage these technologies and create more engaging content. If they don’t embrace the visual aspect of teaching, it will not matter how high def our equipment is.

RICHTER-NELSON: Same as large images have always had: visual impact and ability to really see detail. It is the same as choosing to see a movie in a movie theatre or watching it at home on a TV...even a “big-screen TV.” The impact is not there on a small screen. We have always known the impact of images on learning retention, and if a screen is too small it doesn’t command your attention. I’ve been in classrooms where material is being shown on a screen, but it is too small and most people have trouble even paying attention. In many instances, they are staring down at the printouts on the desk in front of them, worse yet...texting from cell phones. You can FEEL the lack of impact, and the increased DISTRACTION in the air.

TECHNOLOGY INSIGHT FROM CANON: The impact is typically measured by the image quality of the displayed content, and the “take-away” that is often associated by how effective the content is in engaging students and furthering the learning process. Where HD projection stands out is that it enables students and educators to display intricate details and accurate color, instead of having the visual content subject to the limitations of the projection system. LCOS projector technology offers a range of imaging advances that typically bring out the “wow factor” in both still and video images. This can’t be overlooked when presenting student-made videos, or reviewing up-close landscape or nature images, for example.

3. What courses would benefit most from a high-quality image projector and what are some of the innovative applications that this type of projector has been used for on your campus?

BOUTON: Most courses use projectors to display PowerPoint slides or Web sites. There are, however, some types of courses that greatly benefit from a high quality image, most notably geographic information systems (GIS) classes. These classes map datasets onto geographical maps to see interactions between spaces and trends, including crime rates, birth rates, disease vectors, species migration/extinction and so forth. Instructors are constantly moving through complex, detailed maps and datasets. Using a HD projector that can provide high resolution with a large projected image size is crucial.

FORD: I would say that the courses that would benefit most from a high-quality image projector would be art (photography), film, and biology. In our photography classroom, we initially installed a standard projector that was being installed in Smart Classrooms on campus. After talking with Art faculty, we made a decision to install a higher quality projector in the classroom that allowed a higher max resolution and a better contrast ratio. The difference in the quality of the image projected was a night and day difference. In our film classroom, we installed an HD projector and sound system, so that film students displaying their work get a much more cinematic experience. In our biology classrooms, we initially had issues with slides of skin cells projecting as a different color. This was dramatically improved by installing a higher-quality image projector.

KIRK: We current deploy HD projectors in our distance education classroom and in support of instruction involving medical transparencies and microscopy. Not only does the crisper images and cleaner colors displayed by these units permit students to more readily observe the features that faculty are discussing but the higher lumens generally associated with these units permits greater ambient lighting, again heightening the educational environment.

KRAFT: On our campus the arts and sciences come to mind as the top beneficiaries. We have just installed our first HD projection system for the music department, so we don’t yet have data to analyze its impact. Since it replaced the oldest and worst system on our campus, I don’t know how much value we can place on our users’ opinions because nearly anything would have been better than what they had. I will add that we also included some higher-end audio components to complement this system.

RICHTER-NELSON: Interestingly enough, we participated in a very advanced orthopedic surgery symposium hosted by a national medical association here in May, 2012. It was the first live HD broadcast of its kind, and required months of preparation to create the technological handshakes necessary to pull off an Internet event of its nature in five different locations simultaneously.

Each city had about 50 physicians attending. At the front of the room was a screen that had a normal video/audio feed into and out from all the locations. This showed on everyone’s screen as a “picture-in-picture display.” In addition, an HD live video feed was being distributed from one site out to all.

The day consisted of talks from renowned surgeons in the various locations, who used PowerPoints for their talks and panel discussions. The HD part consisted of the latest in hip surgery techniques being sent live from an operating room lab in San Francisco at various times through Internet2 to all the sites. This enabled anyone in any of the locations to question the surgeons who were demonstrating the surgery and for the surgeons to reply in real time.

The day was a success. There were hiccups with feeds from the different locations, but we expected them. But in thinking about the entire event afterward, the thing that I realized was that the definition from the HD feed was astounding...in the control room where it was coming through a 36-40 inch monitor displayed from about six feet away, BUT...the display in the auditorium really wasn't big enough for the size of the room. From the back of the room you really couldn't get the impact of the HD feature at all. I was left underwhelmed, even though I knew the quality of the originating signal was amazing. Again, the issue was not in origination, but in inadequate final image projection size, no doubt repeated at all the sites receiving the feed.

As another example... we are again using an application of HD video in surgery. For the last few years we have had one operating room with an HD video camera mounted in the ceiling over the operating table and controlled remotely from the side of the room with a joystick. Usually the joystick "driving" becomes the charge of one of the OR nurses, a PA, or sometimes me. One of our surgeons has used this extensively for documenting highly complex unique spine surgical procedures that he has developed. We shoot the video, edit it down from say three hours to 15 minutes or less, save it at varying resolutions depending on where he is traveling, and send him off with memory cards to points around the world. Now, the truth is that hardly ever is he able to show the surgery with the unbelievable detail with which it was shot. We are often sending him with much smaller screen size renditions, because the display technology just isn't available widely yet.

Further to this, last month we opened two new hospital buildings with numerous Operating Rooms with HD cameras in the ceilings. So, the technology is advancing from the standpoint of origination. It just hasn't seemed to have reached its potential yet in our auditoriums and classrooms because of the small screens used as displays.

TECHNOLOGY INSIGHT FROM CANON: Every day, students and teachers are discovering new uses for high-quality image projectors. Knowledge is limitless, as is the content created to teach, train, present, analyze, diagnose, document and archive. REALiS projectors have been used for a variety of purposes that impact a range of courses from engineering to medicine to architecture, fashion, science, and more. Innovative applications, for example, include courses that involve the display of 3D models and simulations, where the subtle color gradations displayed by LCOS projectors enables greater understanding of the material through visualization of the teaching concepts.

4. What are the advantages and disadvantages of having an installed projector (permanently installed in the ceiling) vs. a mobile projector on campus? How would you use them differently? And what features of each do you find most useful?

BOUTON: Aside from the risk of equipment theft or tampering, we have encountered very few drawbacks to having projectors permanently installed in classrooms. Having installed projectors is less disruptive than wheeling a cart into a classroom and instructors can devote more lecture time into each class instead of waiting for a projector to be delivered and set up. Mobile systems do allow for greater flexibility for the occasional request that has unique requirements (multiple projection sources, etc.), but they also require a workforce behind them and additional inventory management tasks. We have found that the best solution for us is to have a combined pool of installed and portable projectors, with the vast majority being installed projectors.

FORD: The biggest advantage of a projector being permanently installed in the ceiling is the footprint of the classroom that it frees up. Another advantage is that it allows you to project an image much higher on the wall, which makes visibility better for students. As someone who assists with the installation of projectors on campus, the biggest disadvantage of a ceiling installation is that it is pretty much a permanent installation, meaning that changing the orientation of a classroom usually requires moving the projector and the equipment that connects to it.

The biggest advantage of a mobile projector on campus is its mobility. It also allows you to relocate the projector and associated equipment, without much headache.

On our campus, we typically use a ceiling mounted projector in the classroom installations, and save mobile projectors for faculty checkout, and for projection at temporary events such as meetings and major conferences that occur on campus.

A feature that we find very useful for our projector ceiling installations is the mounting system we use (Chief). The mounting system is universal, which allows us to reuse everything minus the mounting bracket when upgrading the projectors. The best feature of a mobile projector is its weight, and the flexibility that it allows.

KIRK: Part of my department's support philosophy is that we are in the support—not transport—business. There are too many things that can happen when you attempt just in time delivery in an academic setting. In the time that I have been supporting technology in the classroom, I have seen multiple mishaps when projectors are located on carts (fortunately, it was always the projector that was broken).

It has long been my practice to make technology an integral part of the educational fabric. Placing a computer and projector in every classroom advances this goal. As with whiteboards and other basic classroom amenities, instructors do not need to schedule or transport basic A/V support for their classrooms. Moreover, placing a projector in the middle of the classroom frequently requires other furniture adjustments that can adversely affect subsequent classes.

The exception to this rule pertains to specialty equipment, which frequently needs to be transported due to its scarcity. An example of such a device might be a projector with integrated markup capabilities (by adding this feature to the projector, the school might be able to forgo the other expenses) or devices that permit medical transparencies to be displayed. As more faculty adopt a technology, it is easier to obtain budget for ubiquitous placement.

KRAFT: On our campus, which is small, we have about 75 fixed and 45 mobile systems. Neither system is more useful than another. The mobile systems were first created so that resources could be shared in a building, however projection is a requirement in nearly every classroom space these days. Today our mobile systems are actually dedicated to specific spaces and remain mobile only because a cart is often easier to use in a room where the layout or size makes fixed installs impractical.

Portable systems let us rig for special events, such as our Maymester session where education students gather in our science atrium to demonstrate their own teaching techniques.

An advantage of the fixed systems is that all of ours operate the same way, so end user training is minimal. Fixed installs keep the projector and control devices self contained and out of the way whereas mobile systems often cause trip hazards, view problems, etc. A big disadvantage will come with upgrading to HD. In addition to the projector cost we will be faced with costs to swap out switching devices and add scalars so we can accommodate analog equipment while still providing backwards compatibility for things like VHS and VGA guests. We are also occasionally deploying fixed HDTV in place of projection (for example in our ceramics studio where there is too much dust to make a projector feasible).

RICHTER-NELSON: Of course, projectors in the ceiling are more secure. And there are problems with the noise from the fans. I always prefer to put a projector way in the back of the room to avoid the blower noise associated with shorter throw lenses embedded into the audience in a conference room. I would always prefer the flexibility of mobile equipment, but it does require personnel. And it harkens back to the “roll-around cart” days on campuses and schedules of “student A/V techs” scurrying across campus to set up in the back of the rooms. But, hey...if that is what it would take to obtain a big screen image, I would prefer it, and would be quite willing to share the technology.

TECHNOLOGY INSIGHT FROM CANON: Installed units are preferable because you don't have to manage inventory allocation, interchangeable lenses, remote maintenance, etc. Educators should also consider projectors that are compatible with all major control manufacturers, making it easier to integrate them into a complete A/V system. We believe that it is preferable to invest in a “does everything” projector that can suit the needs of the various departments and disciplines, rather than several specialized models. This also makes training staff and replacing inventory easier. Educators may also want to consider a projector that has a universal lens size, so that in the rare event a unit fails, you can keep your lens and swap in a different model by the same manufacturer.

5. Budget and faculty or stakeholder buy-in are typical challenges in implementing new or advanced technologies on campus. What suggestions or recommendations would you offer to your peers in overcoming any objections to the acquisition of HD projectors?

BOUTON: In the last ten years, the world has gone HD. Students are being raised in “HD households” and they expect the same level of visual fidelity when they arrive on campus. Also, HD systems are becoming more affordable to implement so there is less need to incorporate equipment in classroom A/V systems to down-convert HD input signals to support legacy projectors and related components.

FORD: The best recommendation that I would have is to contact the rep that you typically purchase your projectors from, and ask for a test unit of the HD projector that you are looking at purchasing. I think that once you show them an A/B projected comparison of their current projector to the HD projector, the product will sell itself.

KIRK: All new technologies have a price associated with them. As an administrator it is my job to find means to acquire those technologies that enhance the academic mission of the college. Just as no one would suggest using a sub-2000 lumens projector in a modern classroom setting and turning the lights back off, adoption of higher resolution and multi-function projectors has a positive ROI. The question is not always “is the image brighter or sharper” but what additional features do higher end projects bring to the classroom? By deploying projectors with split screen and networked displays, I have been able to permit faculty to introduce more interactive teaching styles and further our emergency notification efforts.

KRAFT: I do not believe we will have objections from the administrative of faculty side. Faculty have already been asking for HD on occasion, and as long as their experience is as good, or improved over previous technologies, the buy-in won't be an issue. Our vision for classroom tech has always been forward thinking and that hasn't changed (but it has slowed with the economy). Administrative buy-in won't be difficult.

Our analog systems are aging and we know they need to be replaced. It makes sense to us to replace them with the next generation equipment. Music on tape got real cheap when that technology died, but after a while you couldn't get it anymore or find anything to play it on. You are just delaying the inevitable by not going HD.

We are already working on a replacement plan with HD. This is something we've been thinking about and planning for a few years. For peers who are just starting out in HD (not replacing analog), the advice is to not even consider analog. Those systems will be replaced before long with HD, making future maintenance and replacement potentially more expensive and you will not gain the visual benefits of HD or compatibility with today's HD devices.

My advice to those who are planning on upgrading is to leverage the age of your current systems to make your case. Have a plan ready so that when a system fails or is at end of life you know what to expect in terms of time and money to upgrade.

When you don't plan, this is what happens: A couple of months ago we were going to just swap out three projectors this summer that were near end of life. An easy project—take them down, stick the new ones up, program the drivers into the control system. We thought it would be cheap and easy. Then we found the mounts on the old projectors were proprietary to the projectors and the manufacturer no longer makes parts to adapt to a universal mount. Then we found out that the mounts were four feet into the ceiling and the new ones needed to be custom machined to fit the bolt locations. When they were originally installed, the building was new and there was no ceiling. Now our installer had to work from a dinky access panel in the ceiling to get at the four feet of pipe and mounting bolts. It took much more time to customize the new mounts and get them installed, putting the whole project back by a few weeks and adding costs we didn't expect (new universal mounts, custom machining to make them fit in the ceiling, time).

If you find yourself in this position with old hardware, those systems can be more expensive to upgrade than you think, so put some planning into making the next upgrade less expensive. HD projectors are coming down in price so we expect they won't be any more costly than our VGA systems were when they were the new thing. While there is still some significant expense, fortunately we designed the majority of our other fixed installs to be easily upgradeable. Our upgrade costs are going to be in the projectors themselves and the control systems. Wiring to the projector and mounting won't be as big an issue in most spaces.

RICHTER-NELSON: I think the argument has to be made, not so much on a monetary cost basis, but on the basis of attention and impact on learning. Perhaps the case should be made by instructional designers or educators who have researched and published the impact of visuals on learning retention. Maybe there is a new study here...same information presented in different settings with different screen sizes and testing to see if there are any significant test score or haptic understanding differences from students. Surely, there would be affective differences in the experience of being in a room with a BIG screen and OUTSTANDING resolution to multiple TVs around the room.

I hadn't realized how much I have thought about this. I've been involved in producing materials for projection, both film and video in both the US and Canada for many years, and in a few cases, assisted consultants who were doing facility design, too. So, having been involved in producing high quality products, and definitely in this year's case of assisting in facilitating the HD live broadcast here on campus, I realize that there is still a disconnect between origination and display. So the horizon seems brighter now that HD projectors are becoming reasonable for education. Very exciting.

TECHNOLOGY INSIGHT FROM CANON: Budget is always a concern, but we see it as part of the performance/value equation. Even when the dollars are tight, there needs to be a standard by which educators can measure ROI and value in the longer term. With this in mind, buying a non-HD projector today places a great many restrictions on tomorrow. You may get a lower price, but you'll probably compromise value. Cutting-edge technology not only extends the useful lifespan of the product, but also helps to demonstrate your school's commitment to technology, something that resonates with current and potential new students. Ideally, budget-restricted schools should consider an HD-quality projector that is switchable between 4:3 and 16:9, so that they can take advantage of better quality, value, and utility now while also enjoying these advantages down-the-road.

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