

# BenQ



## *Projector vs. Interactive Display*

# Projector vs. Interactive Display

## What are the advantages and disadvantages of each technology – and which is best display for typical classrooms

In the last few years, there has been a significant debate on which is the best display type for classrooms – projectors or interactive flat panel displays. Some projector companies insist that projectors are the best for classrooms due to their large image size, while dedicated interactive flat panel providers argue that their interactive smart boards are more advanced and easier to use.

BenQ is unique as being the largest worldwide brand of DLP projectors used in the last two decades, and now the most award-winning smart board brand in North America. We'll take a look at the advantages of each type of display on the following ten critical criteria to help you decide whether a projector or interactive display is right for your classroom.

- |                             |   |
|-----------------------------|---|
| 1. Image Size               | 6. Classroom Ergonomics (e.g, Flipped Classrooms) |
| 2. Brightness & Contrast    | 7. Teaching Tools                                 |
| 3. Resolution               | 8. Safety Factors                                 |
| 4. Interactive Capabilities | 9. Maintenance                                    |
| 5. Audio Support            | 10. Price   |



BenQ Projector Awards



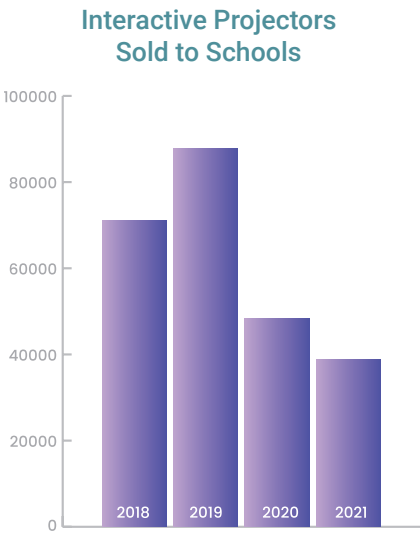
BenQ Board Awards



# How large are the displays used in classrooms in North America?

Projectors have the advantage of being able to show a larger size screen simply by moving the projector farther back. According to Epson’s publication “Display Size Matters,” a 100 inch display is recommended for analytical viewing up to 16 feet away based on a typical California classroom in 2015. But for interactive learning, this has never been practical – and may be one reason that interactive projector sales to schools have fallen dramatically in the last few years.

According to Futuresource less than 2% of interactive whiteboards used with projectors were over 90 inches prior to 2020, while about 75% of interactive flat panels purchased in 2022 were in the 75” class or greater. So, most of the screens used in interactive teaching are between 65 and 90 inches – regardless of whether they use a projector or IFP.



Source: Futuresource - North America

## Lumens vs. Nits – how bright is the actual screen in a classroom?

Projectors are measured in lumens and LCD panels are measured in “nits.” According to Futuresource, over 80% of classroom projectors sold in North America were less than 5000 lumens, while nearly every model of a classroom interactive smart board had 350 nits or higher. Since projector brightness is reduced as the screen gets larger—how can you compare these?

We took two popular education projectors and used the Projector Central estimated brightness calculator to determine how bright each model was on a 100” screen in “foot-lamberts.” Then we compared these to the brightness specifications of the two different models and sizes of BenQ boards.



Here’s how they stack up.

Which is brighter?

	Screen Size	Brightness	Reference	Notes
Epson PowerLite L200SW	100 inches	418 nits	Projector Central	Mfg Foot Lambert Estimated brightness
BenQ LH890UST	100 inches	462 nits	Projector Central	Mfg Foot Lambert Estimated brightness
BenQ Board RE	98 inches	500 nits	Specification Sheet	
BenQ Board RP	86 inches	450 nits	Specification Sheet	

Both 5000 lumen ultra-short throw projectors and interactive displays deliver similar brightness in classroom displays at large screen sizes. For projectors less than 5000 lumens, the screen size for projectors will need to be reduced to maintain equivalent brightness to an interactive smart board type of classroom display.

## Lower contrast in brighter classrooms

The main drawback of projectors compared to an TV powered interactive smart board is the fact that the bright lights of a classroom lower the contrast on a projected image – making it harder to read. Modern smart boards use LCD panels that are backlit and don't degrade as much in bright environments. Projectors rely on low ambient light to create contrast, so without an expensive screen, the effective contrast ratio on an interactive display is greater than a classroom projector in a bright room. Since contrast is the key to enhancing readability, a modern interactive flat panel display does a better job showing text and graphics that are easier to read – helping keep students engaged so they understand exactly what the teacher wants to say.

**Higher contrast  
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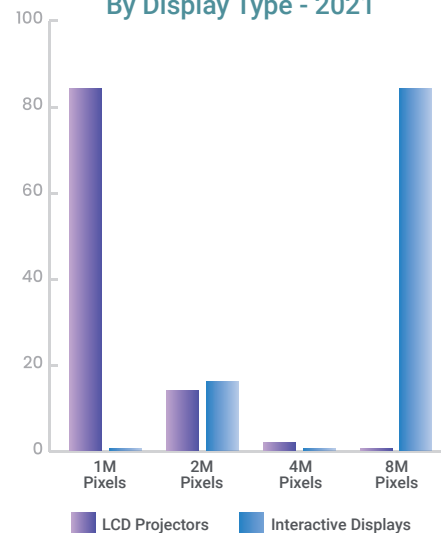
## How Important is Resolution in a Classroom?

Low resolution can also impact classroom readability. So how do projectors compare to smart boards like the award winning BenQ Board? Pixel density is an easy way to look at how resolution can impact readability in the classroom. According to Futuresource, over 80 percent of LCD projectors sold to education customers have much lower resolution than the vast majority of interactive displays sold during the same period. Why is this important?

Let's take a look at a typical smart phone and tablet that most teachers and students own. The current iPhone 14 delivers 460 pixels per inch, while the iPad Pro delivers 264 pixels per inch. But how about a classroom display that is seen by the whole class? The BenQ Board 75 inch TV style smart board with UHD resolution has about 58 pixels per inch. So how about projectors? In 2022 about 80% of projectors sold to schools in the United States have less than 1 million pixels. A typical WXGA projector on a 100 inch screen delivers less than 15 pixels per inch. If that same WXGA projector is used on a smaller 75 inch interactive whiteboard, it still is still less than 20 pixels per inch. The reality is that even 10 years after the first 4K projectors were introduced, some of the largest projector brands selling to schools don't even offer an affordable UHD 4K model for use in the classroom.

Interactive displays like the BenQ Board and Promethean Titanium deliver nearly 4x the pixel density of a WXGA classroom projector on a 100" screen – creating a more detailed image that makes it easy to read.

**Classroom Display Resolution  
By Display Type - 2021**



Device	Pixel Density
iPhone 14 (2022)	460 pixels per inch
iPad Pro (2017)	264 pixels per inch
BenQ Board 75"	58 pixels per inch
Epson PowerLite L200SW – 100"	15 pixels per inch



## Interactive Features and Capabilities

- **Setup and installation**

Interactive displays are easy to install and, after mounting, are ready to use. Interactive projectors are more complicated since they require either an interactive white board or a completely even surface to work properly. In addition, the projector image needs to be adjusted – then calibrated to ensure that the pen location is correct. This can take extra time – and money.

- **Computer requirements**

A classroom smart board like the BenQ Board RP series comes with an integrated computer system that includes interactive whiteboard software, local storage, and the ability to easily connect to a teacher's cloud drive to enable PC free teaching. Most interactive projectors are passive devices—requiring the use of a separate computer.

- **Points of Touch**

The best classroom displays in 2023 all enable a teacher or a student to use their fingers to write on the screen. Some models have up to 40 points of touch, enabling multiple students to easily write on the screen at the same time.

By contrast, many interactive projectors charge extra for finger touch capability – and the most popular models only enable six points of touch – a significant limitation for a modern classroom. Also, compared to the best zero bond touch displays, the response time on a projector interactive display is much lower.

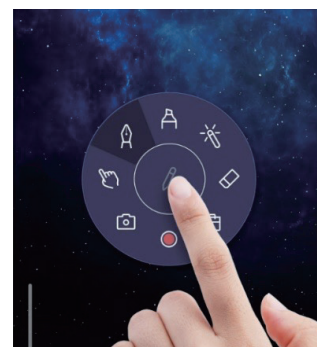


Figure 1- Interactive display can support up to 40 points of touch at one time

## Audio Support

Most classroom projectors have built in speakers but are typically lower powered than the speakers on a typical classroom smart board. For example, the Epson LS630U short throw projector has a 10 watt mono speaker, while a BenQ Board RP series has two 16 watt speakers, a 16 watt subwoofer, and is Dolby Digital Certified for sound accuracy.



Figure 2 - Some smart boards come with integrated array microphones that can for easy lesson recording

In addition to speakers, the best classroom interactive displays have built-in array microphones that can pick up a teacher voice from as far as 15 feet away. These microphones can also mix in other audio sources being played on the display such as YouTube videos with teacher comments.

## Classroom Ergonomics Considerations

By nature, a 100-inch projector screen is fixed on the wall – and cannot be moved. A typical 100 inch 16:10 aspect ratio screen is over 4.5 feet tall and can be as tall as 5 feet high if used with an older XGA model. This can make the upper parts of a projector harder to reach for children.

By contrast, an interactive display like the BenQ Board uses a widescreen 16:9 aspect ratio, which puts the extra working area to each side – rather than on top. It also makes it easier for students to work side by side.

One other advantage of an interactive display is that schools can mount the unit on height adjustable stands that can move up and down to accommodate the student or teacher height without having to recalibrate the display.



Figure 3 – Large 4:3 projector screens can be a challenge for smaller students in an interactive environment



Figure 4- Interactive Classroom TV's can be easily adjusted to enable students to reach all parts of the screen



- **Flipped Classrooms**

In 2000, the standard classroom was designed to have the teacher – and the display – positioned at the front of the classroom. However, research has shown that flipping the classroom can create more engaged students and enhanced learning. For a ceiling mounted projector and 100 inch screen – it is nearly impossible to quickly flip an interactive display or reposition it to a different area of the room.

With a modern classroom TV style smart board, schools can mount the display on portable stands – enabling the TV to be moved wherever it is needed – at any time. The cost of these stands are quite affordable, with [quality models selling for under \\$500](#) in single quantities – and less in bulk.

# Teaching Tools

- **Whiteboarding Software**

While some interactive projectors can enable limited interactive functions without a PC, most classroom projectors don't come with any additional teaching tools. The best interactive displays come with advanced whiteboard software that can enable remote collaboration right from the display.

- **IWB File Support**

The best interactive displays enable a teacher to import pre-built interactive lessons from other teachers stored in the industry standard IWB file format. This enables teachers to save and share their best lessons with other teachers without worrying about which whiteboard software they are using. This capability is not offered in a standalone projector.

- **Network Cloud Drive Connectivity**

The top selling boards from companies like BenQ and Newline enable teachers to instantly connect to their network and cloud-based drives to access lessons and media content with a single tap. While this capability is now available in the latest [smart projectors](#) running either Windows or Android operating systems, it is not available on traditional LCD interactive projectors from legacy brands.

- **Lecture Capture applications**

One big difference is that a classroom interactive display like a BenQ Board has integrated lecture capture software that can instantly record the teacher's voice, record the screen, and mix in audio from other sources like YouTube into a single file that can be shared with students afterwards. Currently, there are no projectors with this capability.



Figure 6- BenQ's EzWrite comes with every interactive display with support for IWB files and extensive teaching tools



## Safety Factors

- **Low Blue Light Output**

Virtually every smartphone today, and the best LCD monitors has a dedicated low blue light mode to ensure that your eyes are not at risk due to excessive blue light exposure. Due to their large light output and amount of teacher / student screen time exposure, many of the latest classroom displays are certified using [EyeSafe certified](#) low blue light filters to protect students from excessive blue light exposure. Currently, this feature is not available on most popular interactive projectors.

- **Antimicrobial Screens and Pens**

Today, both the BenQ Board and the Samsung Flip offer school's screens with antimicrobial coatings to protect teachers and students from spreading germs when interacting with the boards at school. BenQ Boards also have antimicrobial coating on both the remotes and pens to limit the spread of germs when the display is being shared.



Figure 7- EyeSafe certification means less blue light exposure to students and teachers



Low Blue-Light Filter



Flicker-Free Technology



Anti-Glare Glass Display

## Filter Cleaning and Maintenance

While interactive displays and the [best laser projectors](#) for classrooms are completely dust proof, nearly every popular model of classroom projectors using LCD technology requires regular filter cleaning. If the filters are not cleaned regularly, a projector can overheat, burn out the bulb, and void the warranty of the unit. The labor costs and time costs involved in projector filter cleaning is recognized by COSN as an identifiable recurring cost of ownership using the Gartner TCO model.



## Price for Interactive Classroom Projectors vs. Interactive Smart Board Displays

While the initial cost of a mercury lamp based low resolution LCD projector still under \$1000, the cost of an interactive laser projector is similar the same as a BenQ smart board. Here is a price comparison of a popular classroom interactive projectors vs. popular smart board style interactive based on website data in November 2022.

Model	Display	Mount	Whiteboard	Built in CPU / OS	Maintenance	Total
Epson BrightLink 1485Fi	\$3669	\$114	\$449	No	Filter Cleaning	\$4232
BenQ Board RE8601	\$4113	Included	N/A	Yes	None	\$4113
BenQ Board RE7501	\$2748	Included	N/A	Yes	None	\$2748



### Which is a better classroom display – Projector or Interactive Flat Panel?

Many schools have learned the hard way that inexpensive legacy projectors can have higher than expected cost of ownership. According to Futuresource, in 2010 there were over a dozen different brands selling lamp powered LCD projectors to schools, and today there are only four left. BenQ laser projectors are a solid maintenance free alternative to these older models, since they don't have the risk of turning yellow and having to regularly clean filters.

Interactive flat panel displays have several advantages over projectors, including better classroom ergonomics, advanced safety features, and higher resolution. Both displays can create bright images, and projectors can create slightly larger images compared to the largest 98" interactive displays. But for many schools, the cost of a projector and interactive display is about the same when you add in all the extra costs for mounts, screens, and filter maintenance on LCD models.

The easiest way to compare these different types of displays is to evaluate them based on how your teachers plan on using them. For basic split screen teaching where the teacher is at the front of classroom, both projectors and interactive displays are very effective. But if you want to flip the classroom, or have teachers move from one location to another, then interactive displays are a more likely choice—especially if you are planning on recording teachers lectures for student review.