

Projectors in the Classroom, a Lumita Labs Report

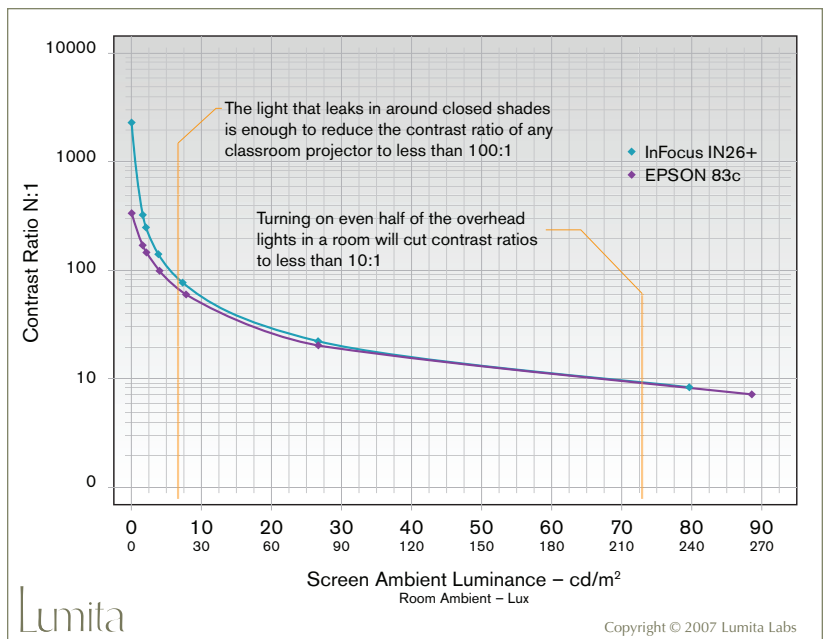
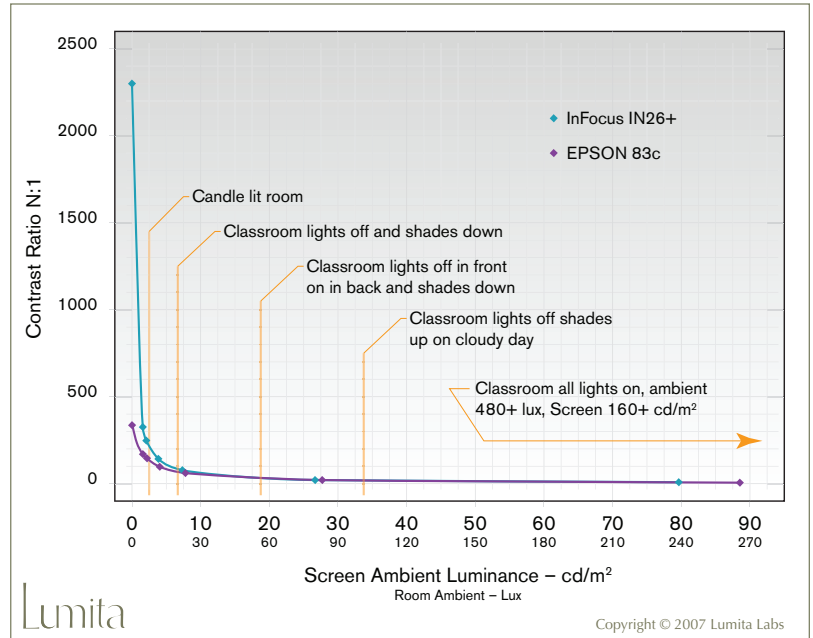
The Contrast Ratio of a Classroom or Business Projector is Irrelevant.

Many projector manufacturers tout the contrast ratio of their projectors and make all kinds of claims about how high contrast ratios are better. If you are building a home theater the contrast ratio of your projector is very important. A home theater is a black room with no light, in order to get rich blacks and images that pop you need a high contrast ratio.

The contrast ratio specification of a projector is measured in total darkness. It is measured with the light sensor directly in the beam. This creates a specification that will give you a good idea of how the projector will perform in a totally dark theater environment. The contrast ratio is simply the ratio of white to black.

Classroom and business projectors are not used in totally dark, black rooms. Most classrooms even with the lights off and the shades drawn have some ambient light leaking in. Digital projectors are often used with the window shades up or even some or all of the lights on. We don't stare directly at the beam of a projector we look at a screen. That screen is in the room and reflects the ambient light around us. In a real world environment the darkest black that we can see is the screen ambient with the projector turned off.

The contrast ratio that we actually experience is the black and white as they are reflected off the screen in the environment. It takes very little light to raise the black level we see on the screen. Two projectors of roughly equal brightness will have very little difference in the actual contrast if theirs is any light in the room.



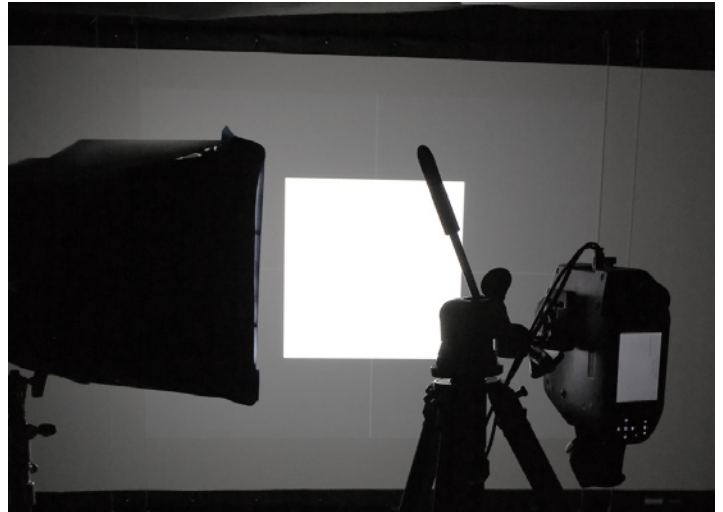
In order to demonstrate this we chose two projectors of equal brightness and very different contrast ratios. One a DLP unit with a 2000:1 contrast spec and an LCD with a 400:1 contrast spec. Both projectors produced about 2000 ANSI lumens of brightness in our laboratory set to their "Presentation" mode.

In the test we lit the screen to simulate ambient light levels that might be found in various environments. The test setup was not bright enough to simulate a fully lit classroom at 480 Lux (the the standard target illuminance for classrooms) but that much light was not necessary to demonstrate the effect.

As you can see from the data, very small amounts of ambient light cause the contrast ratio of the DLP projector to plummet. The amount of light that leaks in through closed window shades (the equivalent of a few candles in the room) causes the contrast ratio to drop below 100:1. In our graphs we are using a screen luminance number that is 1/3 the room ambient, In many cases (if the room is painted white) this would even be higher. Turn on some of the overhead lights, even in the back of the room and the contrast ratio goes down below 10:1.

You will notice that as soon as you add even a small amount of light to the room the difference between the two projectors becomes imperceptible. The human eye will not see a significant difference between 90:1 and 80:1 or 11:1 and 12:1.

In a business projector total light output is what matters, the ability of the projector to rise over the ambient,



both of these projectors produce around 2000 lumens (2052 for the IN26+ vs 1955 for the 83c) at white. The color luminance of these projectors is very different. The color luminance (the brightness of red, green and blue) of the DLP unit is only 639 Lumens compared with 1827 for the LCD.

For more information on color luminance and to see complete reports on both these projectors and others go to www.lumita.com.



InFocus IN26+

	Screen	Black	White	Ratio
1	0.07	0.25	578.00	2302 :1
2	1.61	1.78	580.67	327 :1
3	2.10	2.34	579.37	248 :1
4	3.86	4.12	583.77	142 :1
5	7.33	7.60	586.57	77 :1
6	26.65	26.98	606.63	22 :1
7	79.66	79.89	661.17	8 :1



EPSON 83c

	Screen	Black	White	Ratio
1	0.07	1.66	557.70	336 :1
2	1.61	3.28	559.57	170 :1
3	2.18	3.84	559.97	146 :1
4	4.02	5.68	560.97	99 :1
5	7.79	9.49	565.37	60 :1
6	27.70	29.50	584.47	20 :1
7	88.56	90.26	647.60	7 :1