Next Generation Lighting as the key to Learning Effectiveness and Workplace Efficiency

Sponsored by BoscoLighting Pty Ltd
Australia’s favourite lighting manufacturer, specialising in high quality LED lighting solutions
As consumers we have all experienced the impact of walking into a room that is visually striking. Whether it’s the layout, the styling, lighting, the functionality, warmth and energy, or all of these features, something about it resonates with us. It’s inviting, it’s welcoming and it sets a positive expectation about what will happen in that room.

The aesthetics of quality room design are becoming increasingly common and globally accepted. Advances in all aspects of functional design are seeing the design industry play a growing and critical role in the architecture, layout and synthesis (or blending) of room design features. This has never been more significant than in the workplace and educational facilities. Both of these industries have been able to draw a distinct correlation between quality design, delivering a better experience, resulting in greater output. Evolving beyond nice-to-have’s, these sectors have recognised that appropriate specifications in room design generate a better return on investment, plain and simple. And it’s not hard to see why. In addition to the obvious performance-based outcomes we seek from our students or workers, the competitive nature of all aspects of industry is forcing change. Workplaces actively seek to create environments where worker satisfaction is high, productivity is superior, and staff are happy to spend copious amounts of time in the office. Educational facilities need to ensure their students have superior learning environments, can study for longer hours, and be supported effectively to undertake the tasks they engage their educational provider to deliver.

Typically, good, or quality design is expressed as an environments integration of lighting, layout, structure, furnishing, colours and the indoctrination of technology. Quality design meets defined standards where they exist, and delivers superior benefits to the user. One of the most recent and significant enhancements to quality design, is lighting. Recent studies and research is highlighting the role and impact of lighting as a critical and compelling element in the quality design formula.

This paper will visit the data-points supporting this, highlight industry best practises, and translate this into insights and guidance as to what is available now, for the market to take advantage of this growing trend. Emphasis is placed on the role that lighting plays in this environment, and how this is becoming a key feature of workplace and study-place design. Leading this trend in Australia is BoscoLighting Pty Ltd.

The role of lighting in the Workplace

Standards exist in Australia, defined by AS (/NZS) 1680 series, prescribing minimum levels of illuminance required for certain working conditions. This is largely to ensure that workplace health and safety requirements are met. There is increasing evidence however that better lighting is able to enhance performance and productivity of the workplace community. This is of significant interest to workplace designers, architects and businesses alike. Studies indicate that superior lighting can deliver improvements in the range of 10-50 % in productivity. Effective lighting can similarly decrease errors between 30-60 %, removing the need for costly and timely re-work. Other negative impacts of inadequate lighting account for prevalence of eye-strain and headaches, nausea, and neck pain which often accompanies eyestrain¹. For insurance and productivity reasons, these occurrences are actively sought to be minimised and eliminated.
It is typically accepted that effective lighting in the workplace will promote:

• a reduced risk of occupational accidents and health problems;
• better concentration and accuracy in work;
• a brighter, cleaner workplace resulting in a more active, collaborative and up-beat environment;
• improved work performance;
• better visibility, improved accuracy and increased work-speed enhancing production.

Of course this is the goal for many businesses. Provide an environment that will optimise workforce performance whilst minimising the negative impacts and inefficiency of a poorly configured and lit environment.

But for many businesses, the challenge is about moving beyond this. In many workplaces the opportunity surrounds creating superior workplace design and lighting to enhance productivity, packaging highly desirable and functional facilities to attract the best staff, and obtain the best from staff. In non-traditional ways, the workplace is being redefined, with functional specifications having evolved significantly in the last fifteen years. The mobile nature of the workforce is forcing redesign in office spaces, and subsequently, lighting. So whilst technology is creating new channels for how and where business is done, the role of the office has emerged to no longer simply be where employees go each day. The modern office is becoming the communication hub for employees, vendors, partners, stakeholders and the organisation’s clients. A collection point for ideas, exchanges, collaboration, face-to-face engagement and where relationships are formed. For these reasons, the definition of quality office design becomes much more about being fit-for-purpose and delivering to the new set of twenty-first century requirements. The office now fulfils various roles as the engagement point, place of efficient work practise, and the marketing tool for presenting and positioning a business to its commercial ecosystem.

Let’s take a closer look at the modern office. Today, offices and workplaces are becoming a collection of defined spaces, that each serve a purpose. Traditional designated management offices and workers-spaces are giving way to new office specifications. Typically, office designs are now reflecting the need for break-out areas, hot desks, collaboration hot-spots, and areas designated as meeting spaces that encourage exchange. These are significant changes. Boardrooms and meeting rooms accommodate multi-media content display and are organised for presentation and exchange. They are moving from low to high-utilisation spaces, as a primary driver for workers to attend the office, to deliver or contribute to a presentation or team discussion. Further, the commercial footprint of businesses is under pressure to reduce, for economic reasons, reflecting the advent of telecommuting. With business encouraging remote working, the office is playing very specific roles for specific groups of workers at specified times in the weekly work cycle.

As you might expect, the lighting requirements need to be matched to each work space, to ensure each designated area achieves its goals. Break-out areas need to be well lit, and support high levels of interaction and activity, as places where workers congregate. Meeting rooms need to allow for variable lighting, to support presentation content and visuals. Open plan areas need to channel direct sunlight and optimise the natural environment. Hot desks and working spaces need to be able to regulate direct or bright light, minimise reflection and glare, and ensure computing screens offer visual ease.
Further drivers of change in office design and lighting stem from the combination of economic and sustainability factors. The realisation of carbon emissions from electricity has encouraged many businesses in Australia to explore lower emissions and lower-power alternatives. This is driving the move to LED and natural light utilisation, and is carrying increasing interest in areas such as the NABERS rating\(^2\), as a contributor to building efficiency. Adding to this, we are seeing the incorporation of lighting and automation-controls such as motion-activated sensors for low-utilisation areas and out-of-hours control, as well as scheduled, pre-programmed lighting for specified areas. In each respect, we are seeing significant substitution in the style and type of lighting being deployed.

NABERS rating\(^2\), as a contributor to building efficiency. Adding to this, we are seeing the incorporation of lighting and automation-controls such as motion-activated sensors for low-utilisation areas and out-of-hours control, as well as scheduled, pre-programmed lighting for specified areas. In each respect, we are seeing significant substitution in the style and type of lighting being deployed.

With the above factors as a backdrop, there are various pressures being brought to bear upon conventional workplace lighting. Ensuring functional outcomes can be achieved through efficient and effective lighting design is receiving wide-spread adoption. It sounds simple, but the matching or mapping of lighting requirements to the various work hubs and departments within a business has become common-place. Coordinating a business to deliver “in the right light”, has become the new standard. Further, the ability to introduce flexibility into lighting and visual-management of workplaces and workspaces, is receiving outstanding support from the market.

A stand-out of improvement in lighting and workplace environment optimisation in recent times has been seen in the popularity of indirect lighting. Research and documented studies on effective lighting are expounding the various benefits and means with which indirect lighting is revolutionising the modern workplace. The most well-accepted commercial indirect lighting source is extrusion lighting. More on this shortly.

The role of lighting in Education

Over the last century we have witnessed a trend that is presenting a full-circle return to natural lighting. Until the 1950’s natural light predominated as the primary source of lighting within schools and university campuses. It made sense. The degree of specialisation in content and facilities did not exist, and most lecturing occurred in daylight hours. The next fifty years saw a movement away from natural lighting, with incredible improvements in lighting design, underpinned by reduction in electricity costs. The ability was there to provide broad, intense, universal lighting, across a facility, around the clock, and so it was delivered.

Interestingly, we now see a return to achieve natural lighting, delivered both naturally and artificially. Understanding and awareness in the psychology of study, and the benefits of natural and diffused light, are bringing natural light back, with a difference. These changes are contextualised by the focus on student learning experience, and to customise, regulate and manage lighting flexibly, on a real-time basis.
Today’s focus on education quality, the knowledge economy and lifelong learning, has placed new emphasis on all elements of education. Traditional Ivy League campus structures are being challenged by modern, agile institutions, introducing new curriculum content, new channels for content delivery, as well as creating highly functional, collaborative, inspiring facilities that mirror progressive workplace structures. This should come as no surprise, as we see more and more educational facilities adopting commercial business models and actively differentiating to compete in the market for students. This level of competition translates into innovative campus design, just as it has for workspace in the workplace.

One of the common transformations being played out in educational facilities is the movement away from the traditional lecture theatre as the predominant learning locale. Instead, the mode of learning is more pervasive, with students equipped with portable devices that need to be connected at all times, and viewable in all locations on campus. The concept of the learner station is becoming mainstream, with the need for flexible lighting across the learning daily cycle (which is no longer 9 till 5) to deliver an appropriate visual experience which minimises glare, reflection, shadowing and dark spots.

In traditional learning theatres, there is the need to optimise viewing comfort and experience. This is being supported through lighting controls, where for example, rows of seating adjacent to natural light sources such as windows, can receive toned lighting. This same flexibility is delivering a standardised (universal) approach in dark hours, where natural light is no longer a consideration. Task lighting is being introduced, especially for presentation areas to enhance viewer perception. In this way, during a media presentation where lights are dimmed for example, students can continue to receive adequate lighting for note taking etc.

Somewhat consistent with the transformation occurring in the corporate environment, education facilities require specialised, fit-for-purpose lighting, which delivers flexibility and features that emulate natural light. The following principles are being adopted in the design and specification of new campuses and structures:

- balanced, diffused, glare-free daylight from two or more directions;
- appropriate light levels for the tasks required in each space;
- operable shading devices to regulate and manage external light intensity;
- windows to serve for natural light integration, as well as offering outlook for students;
- exterior shading to minimise solar heat impact;
- cool daylighting – the amalgam of glazing systems, light filtration, and room / structure design to allow for the simultaneous reduction in electric lighting and cooling loads;
- cost-effective solutions – additional economies are gained where integration with natural light is used. Through daylight harvesting³ methods, LED lighting is able to be dimmed without reducing light levels, reducing both electricity and maintenance costs;

In these ways we are seeing dramatic and significant shifts in the role, structure and style of lighting being deployed throughout the education sector. As with the corporate sector, the practicalities and momentum have built strongly towards indirect lighting.
Indirect Lighting and Major Trends

Indirect lighting is typically described as that which delivers light from a reflected surface, either a ceiling or wall, or other nearby structure. The fixture may deliver luminance fully from a ceiling (100% up), semi-direct (90-100% up) or direct-indirect (70-90% upwards). Indirect lighting is acknowledged as the preferred source of lighting to emulate natural light. The strong appeal with indirect lighting, is that it offers the benefits of natural light without the occurrence of glare, or the “moving” nature of direct light over the course of the day. In addition, indirect light can bring the look, feel, and coolness of natural light to a room without the need for external windows or sky-lights.

Before the turn of this century, the developments and advances in indirect lighting were somewhat uninspiring. The market perceived the category to be expensive, inflexible, difficult to specify, and significantly, its benefits to the consumer as a natural-light alternative, were not well understood.

But over the last fifteen years there have been several major developments which have turned this around. The most significant of these is attributed to various research-based support of natural lighting and natural-lighting alternatives. The market has begun demanding natural light and its alternatives, for aesthetic, psychological, productivity-based and economic reasons.

The additional changes contributing to indirect lighting growth include the following:

• maturing of the segment and growing market acceptance of indirect lighting, especially when and where natural light cannot be achieved;
• growing demand has spawned segment growth which has in turn increased competition, leading to standardisation, simpler installation, shorter lead-times, better packaging, lower costs and a broader, deeper range of products;
• a general reduction in ceiling heights has allowed for lower brightness (power and illuminance) needed to achieve quality lighting results;
• improvements in surface choices and design, especially in terms of sheen levels on walls and ceilings, has enhanced the reach and projection of indirect lighting;
• design improvements have resulted in better linear product structures, with fewer fixtures and fewer power-drops. This means that fixed up-front costs are usually lower than comparable non-linear, standard lighting systems. From the advent of T5 lighting through linear LED fittings, the resultant drop in required fixtures has also contributed to lower overall costs.
• improvements in quality in LED lighting, lower emissions and the virtual removal of the need to maintain and replace bulbs has reduced operational costs significantly;
• automatic controls which blend and regulate indirect lighting in tandem with natural lighting have delivered a consistent look and natural-light feel, around the clock;
• these automatic controls, including the indoctrination of motion detection have delivered lower lighting utilisation, reducing usage costs and maintenance costs and have extended product lifecycles;
• technology integration that allows remote control and manual intervention from anywhere, anytime has provided unprecedented control over lighting and the consumer experience.

These changes in the indirect lighting market have been compelling and have facilitated the transformation of corporate and education lighting. The market and applications as we know it, have changed yet again.
Introducing the BoscoLighting BLEX range of Indirect Illumination

In response to the growth, the demand, and the transformation in both education and corporate sectors, BoscoLighting brings its BLEX product range to the fore. The extrusion lighting range introduces diffused light functionality in a selection of stylish, modern and edgy designs. Designed to accommodate a variety of room sizes, ceiling heights, and design parameters, Bosco’s extrusion lighting range comprises nearly 80 styles, with the added availability of custom design, where required.

The BLEX range comprises:

- A set of recessed extrusion designs, perfect for benches, cabinets, shelves, stairs, furniture, exhibition stands or projects that require a stylish and minimalist lighting solution. They are easy to install with flush mounting, resulting in a smooth and elegant finish. BoscoLighting also offers cut-to-length options, which save time and effort.

- Surface-mounted designs, which offer a partial recessing for when a statement is to be made through the lighting fixture. These carry the same easy to install features and are also available in up-down wall-mounted configurations.

- Corner extrusion fixtures, designed for the joints between walls, cabinets or ceilings to deliver a striking minimalist lighting solution. This range is lightweight, is easy to install with bonding-resin usually sufficient for adhesion.

- Front-emitting designs perfect for situations where recessing lights are not an option. This range will help set the mood of each room in the office, auditorium, library or break-out area, creating a distinctive modern flare.

- A range of modern diffusers, available in curved, rectangular, suspended and tubular designs, are available for housing BoscoLighting strips or modules. These provide a stylish and finished look. Selectable diffusers provide a more evenly-distributed and consistent illumination, perfect for architectural and commercial linear applications.

- Triple channel extrusion, where greater light intensity is required, to showcase a feature wall or architectural feature.

- Waterproof PVC extrusion, which are beautifully designed for wet areas such as bathrooms, change-rooms, kitchens and areas subject to humidity.

Made using 100% recyclable aluminium, BoscoLighting’s RoHS compliant extrusion range is mercury free and completely non-toxic. Highly efficient, it uses minimal power while achieving high lumen output, perfect for the environmentally conscious as well as those paying electricity bills.

The BLEX range includes BoscoLighting LED lighting componentry, designed with creativity, flexibility, and functionality in mind. With a style and design for practically every application, you’ll see why the BLEX extrusion lighting suite is receiving national acclaim.
Reference

http://www.iar.unicamp.br/lab/luz/id/Arquitetural/Handbooks/lighting_in_the_workplace.pdf  
http://www.nature.com/news/the-myopia-boom-1.17120  
http://ergo.human.cornell.edu/lighting/lilstudy/lilstudy.htm  
www.boscolighting.com.au

For more information on the BLEX product range visit the BoscoLighting website @ boscolighting.com.au or call 02 9188 3470 to speak with one of Bosco’s knowledgeable technical staff.

For more information on the corporate and educational facility installations, please contact BoscoLighting or lodge an enquiry at info@boscolighting.com.au