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PLANNING LEARNING SPACES

FOR ARCHITECTS DESIGNERS AND SCHOOL LEADERS

SHAKE, RATTLE AND ROLL!

MEET THE DESIGNERS REVOLUTIONISING CLASSROOM SEATING

SEATING SPECIAL: EIGHT OF THE BEST CHAIRS FOR LEARNING ENVIRONMENTS

PLANNINGLEARNING SPACES

We believe the learning environment has a profound effect on the educational outcomes for all pupils. If you would like to join us to improve these environments worldwide we would love to hear from you. This magazine is a not-for-profit journal and is the official magazine for A4LE (Europe). It is given free to European members and distributed to 8,000 A4LE members globally in e-format. If you would like to contribute articles to the magazine or purchase additional copies please contact us.

Editorial Adviser	Irena Barker
Editorial Board	James Clarke
	Murray Hudson
Production Editor	Suzanne Kyle
Sub Editor	Christopher Westhorp
Design	clockstudio
For A4LE (Europe)	Terry White

CONTACT:
magazine@planninglearningspaces.com

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Enhancing the Educational Experience

PHOTO CREDITS:

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ARE YOU SITTING COMFORTABLY?

IRENA BARKER
EDITORIAL ADVISOR

When furniture designer Avron Levin was testing out his RockerOtt™ seat he was delighted when "all hell broke loose" in the classroom. The small colourful ottoman prompted the children to explore its possibilities, using it to sit, straddle, rock and roll. But Levin, creative director of the NorvaNivel brand, is just one designer in a long line to take on the issue of classroom seating.

Creating an ideal classroom chair that is comfortable, ergonomic for everybody, relatively cheap and robust has been one of design's toughest nuts to crack. That is why, on page 10, we take a look at some of the best classroom chairs currently on the market. While the RAY chair encourages "perching", the Ruckus adapts to the sitting style of the user. The makers acknowledge that students often want to sit in "non-traditional ways". I can attest to this as a mother of three watching my own children enjoying six hours a day of online lessons during the Covid lockdowns.

Back at school, the Year 4 classroom at Trumpington Park Primary School in Cambridge, UK, has been transformed under the pilot of Planning Learning Spaces in Practice. On page 32, we report on the very positive analysis of the impact of the scheme by learning environment guru Professor Peter Barrett.

Pupils at Glasgow's Kelvinside Academy also started the new academic year with new classrooms, inspired by the Scandinavian model that prioritises play and relationships, where learners can choose their seating: at a desk, on the floor or in separate, glazed breakout rooms (see page 42).

While progress is being made, there is no doubt the "cells-and-bells" approach to school design, dismantled by Fielding International's Nathan Strenge in his article on page 38, is very much still in favour. Fielding's new Design Patterns app hopes to further encourage the creation of learning spaces that foster "belonging, creativity and collaboration".

In uplifting news, it has been good to hear that the UK government is finally cottoning on to the importance of monitoring CO2 in classrooms – something this magazine has highlighted in the past. Its aim is controlling Covid rather than improving learning environments, admittedly, but it's a start. Professor Stephen Heppell, high priest of CO2 monitoring, who writes about the issue on page 50, will be pleased.

So, with all these themes in mind, please sit down – or maybe lie or perch – and enjoy a good read.

PLANNING LEARNING SPACES IN PRACTICE REPORT PUBLISHED

An evaluation of the Planning Learning Spaces in Practice (PLSiP) pilot project at Trumpington Park Primary School in Cambridge has been completed, with results showing that the new classroom spaces, designed through the PLSiP design framework, have had positive effects on teachers, pupils and learning.

Workplace environment guru Professor Peter Barrett was asked to write an evaluation of the PLSiP project at Trumpington Park after the new classroom had been in use for a year. A comparison of average learning progress in core subjects between Year 4 pupils using the new room and Year 3 students in standard classrooms suggested that it could lead to improved academic outcomes over time. In his summary of findings, Professor Barrett writes: "In almost all cases the increased flexibility and associated choice presented has been a positive opportunity that has resulted in a stronger overall class performance." Head to page 32 to find out more.

"WE NEED TO BE ABLE TO LEARN ANYWHERE."

Showcasing the essence of playful learning environments from Beijing to Buenos Aires, *Play to Learn – Designing for Uncertainty* is the third book by internationally renowned artist and designer Rosan Bosch.

The book is a hands-on guide to designing playful learning landscapes that support life-long learning. Bosch argues that learning through play should be one of the key strategies in learning situations because learning spaces that offer diversity and flexibility in ways of interacting, sitting, moving and creating have a strong impact on learners' self-agency and creative problem-solving skills.

"The pandemic has made it very clear that we need to be able to learn anywhere," Rosan explains.

"By placing the learner at the centre – not only in the built environment but in all learning situations – learners can unleash their natural born curiosity and achieve twenty-first-century skills that prepare them for an unpredictable future".

CARBON DIOXIDE IN CLASSROOMS: WILL THE GOVERNMENT SCHEME TO INSTALL CO2 MONITORS IN CLASSROOMS WORK?

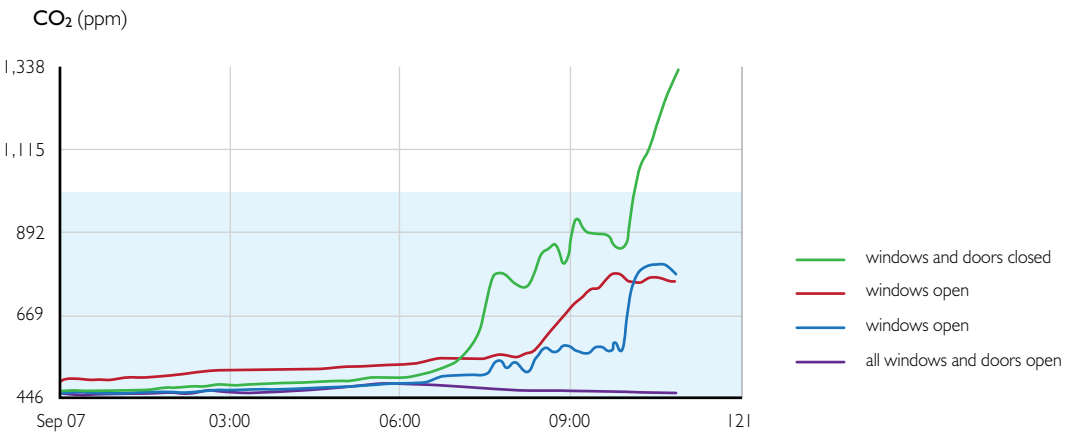
Regular lateral flow tests, vaccines for 12–15-year-olds and isolation only for people who test positive for Covid-19. These are some of the ways UK schools are trying to minimise disruption to education and claw back learning time lost to the pandemic. To add another weapon to schools' armoury, in August the UK government announced that carbon dioxide monitors would be allocated to all state-funded educational settings to enable staff to identify areas of poor ventilation; the theory being that if you improve ventilation, you reduce the spread of virus-laden droplets. While the rollout of the CO2 monitors has, perhaps inevitably, been slow to start, the rollout seems to be gathering pace. But will it help?

Professor Stephen Heppell has been talking about the impact on learning of high CO2 levels for a number of years. Here, he explains how CO2 behaves in classrooms.

"In this graph the steeply rising line at the start of the school day is from a learning space with windows and doors closed. The middle two lines are spaces with windows open; sadly, CO2 is a heavy gas, like the Covid-19 aerosol droplets, and so the room is only refreshed above windowsills. Lower down, where the learners' heads are, it's still a very poor fetid environment. The bottom horizontal line on the graph is from a learning space with all windows and doors open. Dramatically better. Of course, even that is dependent on air movement refreshing the space. On a very windless day it would be less good."

Professor Heppell and his team developed Learnometer to measure not just carbon dioxide but temperature, humidity, noise, air quality and a range of other factors that all have an impact on learning. On page 50 Professor Heppell explains why CO2 is only part of the problem, particularly for schools in urban areas where air pollution is high and opening the window could simply replace carbon dioxide with other, more dangerous pollutants.

As to whether the government's CO2 monitor scheme will help to reduce rates of Covid-19 transmission? Watch this space...



THE BENEFITS OF DYNAMIC SITTING FOR CHILDREN IN SCHOOLS

Levent Çaglar, Chief Ergonomist at Furniture Industry Research Association (FIRA), explains the ill effects on children from having to adopt static postures for prolonged periods versus the health and learning benefits of dynamic sitting.

Back pain among schoolchildren is on the rise. About 12 per cent of 12-year-olds and 22 per cent of 16-year-olds experience recurrent back pain, and 15 per cent of 12–16-year-olds seek medical care for this. Causes of this back pain include using ill-fitting, inappropriate furniture during the 15,000 hours they spend sitting at school when their body is growing. Another factor is carrying heavy loads of books and equipment when appropriate storage is not made available.

The importance of posture for health and learning

Ill-fitting and static chairs can also limit children's learning capabilities by forcing them to adopt postures where their abdomens and chests are compressed. This reduces their oxygen intake and consequently restricts the supply of oxygen to their muscles and brain, making their limbs feel tired and their brains less alert. It inhibits their learning and may affect their healthy growth. Seating that allows children to increase the angle between their legs and torso, such as through a forward-tilting seat, helps them to breathe better and improves oxygenation of their muscles and brain. Chairs like Acclivity (by Learniture) and RAY (by Labofa) nicely allow children to open up the angle between their torso and thighs, enabling them to improve their breathing and keeping their back in the natural S-shape.

Prolonged sitting on inappropriate furniture can restrict the blood supply to the lower legs and feet, making children become restless and fidgety in class, resulting in a decrease in concentration as the lesson progresses and an increase in disruptive behaviour. To achieve a good fit does not necessarily mean physical adjustments in the chair; a good design can have integrated solutions to achieve a better and wider fit for varying sizes of children. Shining examples of this are Newton (by Orangebox), Tip Ton (by Vitra) and Level (by VS) chairs.

Promoting crucial movement

Children naturally move all the time, especially at young ages. Movement is essential to their growth and for strengthening their muscles. For example, rocking sideways, backwards and forwards when standing and sitting are key actions for children to develop their balance and strengthen their back muscles to maintain good postures. Artificially stopping them from moving by giving them furniture which prevents them from doing so results in children tipping their chairs backwards on the back legs, creating both a danger of falling and a distraction in lessons. Because children cannot make small movements while sitting, they make gross movements, such as sitting sideways or resting their upper body on the table, which can be disruptive and prevent them and others from concentrating. Chairs like Tip Ton, Newton, Level and Situ (by Jackie Lightfoot) enable children to rock gently, comfortably and safely.

Teaching methods and the use of technology generally force children to work in static unhealthy postures – and teachers often associate movement with misbehaviour and ask children to sit still and not move, when, in fact, being able to adopt healthy dynamic postures increases alertness and productivity. To get children to adopt dynamic postures, they need chairs that will allow them to rock or recline a little, turn round to talk to others or watch as the teacher moves.

LEVENT ÇAGLAR AND JACKIE LIGHTFOOT ON SITU, AN ERGONOMIC SEAT FOR PRIMARY SCHOOLCHILDREN

With children's increasingly sedentary lifestyle outside school and during break times, it is essential that school seating promotes dynamic postures and that furniture and activities support shorter periods of sitting, such as when working standing up at higher-level work surfaces and frequent alternation between sitting and standing.

In order to promote healthy movement, schools need to take broader account of the link between healthy bodies and minds. Schools need to go beyond increasing healthy eating and promoting bouts of exercise. The environment, furniture and teaching activities need to promote natural movement and healthy postures throughout the day.

What we need from school furniture for the future

In order to improve children's health, well-being and learning ability, and reduce disruptive behaviour in schools, seating solutions considered should:

- promote the well-being of children, especially their backs.
- provide dynamic sitting, such as a built-in rocking motion, and encourage movement during and between activities.
- accommodate healthy use of technology and equipment, without putting children's necks, shoulders and wrists at risk.
- ensure a good fit to all sizes of children.
- be flexible and adaptable to a range of activities and children.
- be comfortable and perceived to be comfortable.
- be aesthetically pleasing and inviting to use so that children will have ownership. ■

THE FINEST SEATS OF LEARNING

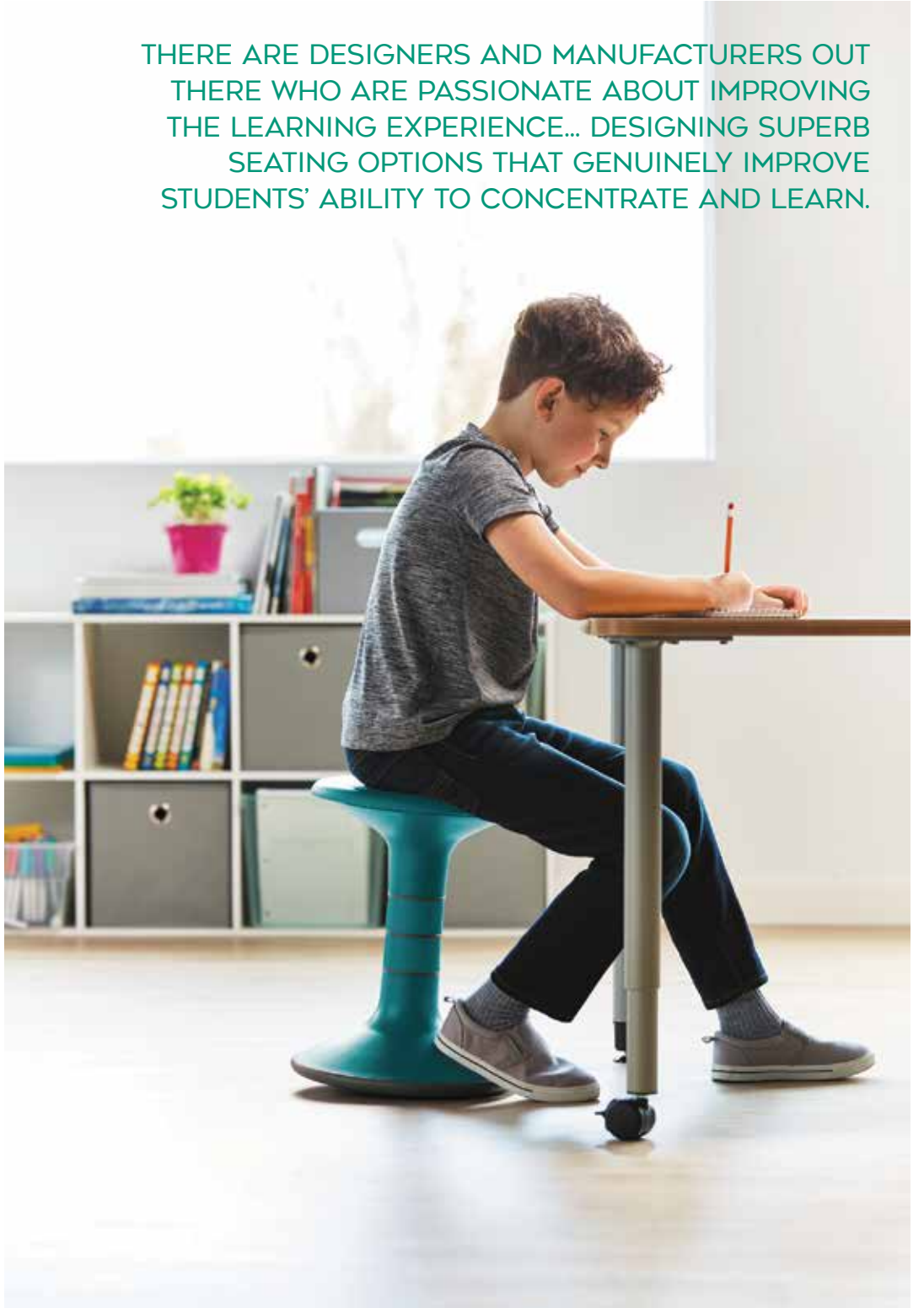
“Sit still and concentrate” is consigned to the history books as educational seating designers embrace sound ergonomics and movement to improve the learning experience. We’ve chosen eight of the best school chairs around today.

Anyone who has earned their design stripes, whether in furniture, buildings or fashion, usually has “feelings” about chairs. From the swivelling “James Bond” cool of the Arne Jacobson Egg, to the clean Danish lines of Hans Wegner’s Wishbone, via the leathery luxe of the Eames Lounge Chair, if you’re a designer you’ll have a favourite and an opinion.

However, when it comes to design qualities of school chairs, it could be argued that the priority is less “aesthetics and gorgeousness” and more “does it stack, will it break and how much does it cost?” (Questions to which KI’s iconic Postura chair answers “yes”, “no” and “not a lot”, which is why it enjoys such enduring popularity with schools the world over.) School chairs aren’t going to occupy a glamorous hotel lobby, they need to comfortably accommodate a person who, at senior school, could be anything from four feet six inches (137 centimetres) to six feet three inches (190 centimetres) tall and needs to occupy said chair for six hours a day, five days a week while remaining healthy. As design challenges go, it’s complex.

You might think this complexity, combined with the understandably pragmatic and cost-sensitive view of many schools, would deter designers from grasping the nettle of school seating design but, happily, this is not the case. There are designers and manufacturers out there who are passionate about improving the learning experience, who want children to benefit from better ergonomics and comfort, who recognise the need for learners to be able to move and who are designing superb seating options that genuinely improve students’ ability to concentrate and learn. Let’s just say things have moved on a bit since Hille’s iconic Robin Day chair...

THERE ARE DESIGNERS AND MANUFACTURERS OUT THERE WHO ARE PASSIONATE ABOUT IMPROVING THE LEARNING EXPERIENCE... DESIGNING SUPERB SEATING OPTIONS THAT GENUINELY IMPROVE STUDENTS’ ABILITY TO CONCENTRATE AND LEARN.



ACCLIVITY

IMPROVES BLOOD FLOW, BECAUSE OXYGEN IS FOOD FOR THE BRAIN

Good posture, increased blood flow and enhanced comfort have direct learning benefits and the Acclivity student chair from Learniture is ergonomically designed to provide them all. With its slightly higher seat and "waterfall" edge, the Acclivity chair is designed to take the pressure off the back of the thighs and widen the angle between legs and torso, freeing blood flow to vital internal organs. Oxygen is food for the brain and keeping the blood flowing maintains the supply of oxygen-rich blood to the brain, making it easier to concentrate.

Acclivity was created by the highly respected industrial designer Anthony Hill, whose passion for ergonomics led him to develop a range of furniture to encourage better posture in schoolchildren, driven by his belief that increased comfort leads to better learning. Its dynamic, reverse cantilever frame provides a degree of flex and bounce so users can fidget uninhibited. Fidgeting is often thought to mean students aren't concentrating (hence "sit still and concentrate") but movement increases blood flow, which is vital to maintain focus, so allowing some "wiggle room" is in fact helpful to learning. Seated in Acclivity, users can stick their feet straight out in front of them and lean back or tuck them under the chair to lean forward, allowing enough movement for comfort and to maintain concentration, without disturbing others.

BODYFURN

COMFORT = CONCENTRATION

Just as New Zealand's Furnware embarked on the design journey that led to the development of Bodyfurn, research from Massey University discovered that 96 per cent of secondary school students were seated in furniture that didn't fit them. Designer Murray Pilcher was contracted to design a new chair and subsequently discovered that the European sizing standards simply didn't work for the growing ethnic and size diversity inherent in New Zealand's student population. What followed was a three-year, nationwide research programme that saw Furnware working with ergonomists, teachers and principals to measure the height, weight, ethnicity, gender and age of over 20,000 students while studying their behaviour in class, looking for ways to assist their learning.

Bodyfurn is a dynamic, reverse cantilever chair with a seat and back that pivot independently to move with the student, helping support the user in the three most common seating positions, improving comfort levels.

The chair allows positive movement, increasing blood circulation and helping students to concentrate. While ergonomic comfort is integral to Bodyfurn's design, teachers also report a 70 per cent reduction in off-task behaviour and students say they feel more comfortable in a Bodyfurn chair compared to a static chair. There are over half a million Bodyfurn chairs in schools around the world and in 2005 it was awarded the Designers Institute of New Zealand's Design Innovation Award.

LEVEL

LEARNING TOGETHER AT EYE-LEVEL

For young learners, having something explained to you by a peer often results in a "lightbulb moment" of understanding in a way that interventions by teachers or parents sometimes can't quite achieve. Peer-to-peer learning also enables older students to develop communication and collaboration skills while nurturing their younger counterparts, creating a more-cohesive school community where friendships aren't confined to a single year group. Little wonder then that mixed-year learning is on the uptick in schools, but accommodating different year groups on the same furniture presents something of an ergonomic challenge.

Enter Level, a chair designed by VS to enable younger and older learners to sit comfortably at the same height table. Its tool-free adjustable footrest has a click-lock mechanism that pupils can move up or down to suit their size. Cross-struts ensure stability and prevent the footrest from becoming tilted or jammed, while the ergonomically shaped, climate-optimised polypropylene shell is double-walled to provide comfortable, dynamic sitting on a steel tube cantilever frame. Even if a student stands up on the footrest, Level stays level and won't tilt.

Launched in 2016, Level comes in two models, one for elementary or junior schools covering sizes two and three, designed to work with a table height of 71 centimetres, and one for secondary schools covering sizes four and five, suitable for a table height of 76 centimetres.

NEWTON

ERGONOMIC, ACTIVE SITTING FOR 11-YEAR-OLDS TO ADULTS

In 2009, when Orangebox designed the Newton Chair, the UK's Building Schools for the Future programme was in full swing, with more investment going into school environments. Jim Taylour, who at the time was Senior Ergonomist for Orangebox (he's now their Head of Design and Wellbeing), saw a dimensional misfit between youngsters and the furniture they were using in school creating an "ergonomically hostile environment" that risked discomfort, fatigue and loss of concentration.

The stature of young people has increased in recent decades which, coupled with rising rates of obesity, meant 50 per cent of teenagers were complaining of discomfort at school when Newton was designed. Orangebox research measured the relationship between stature and "perceived" or "surface" lumbar and found that the natural curve of the spine in larger individuals shifted upwards by up to 100 millimetres, with corresponding shifts in the transverse curve. This new body shape, combined with the lack of agility and mobility in a standard four-legged chair, was a recipe for discomfort.

Rigorous research conducted with educators, health professionals and furniture industry experts led Taylour and his team to believe that a reverse cantilever chair with a passive, less-contoured backrest would work for a variety of anatomical shapes. Newton's forward-sloping adjustable seat and integral footrest solve the problem of dimensional mismatch while the reverse cantilever allows a healthier rocking action, enables side-saddling and ease of access.

NODE

FOR RAPID TRANSITIONS BETWEEN LEARNING MODES

Steelcase designed Node to respond to the evolution in teaching methods that sees group projects, individual work, peer-to-peer learning, direct instruction and lecture-style teaching occur in the same space, sometimes within the same lesson. Interactive pedagogies require fluid learning spaces where everyone can see and interact with content, technology and each other, but shifting from one mode to the next is impossible if you're sitting in static rows and columns on chairs that are designed for sitting still. The highly mobile Node is designed to enable quick transitions between learning modes and preferences.

Node's personal work surface is non-handed (suitable for right-or left-handed people), adjusts for large and small users and moves independently of the seat shell and base.

The work surface also incorporates a tablet stand and is large enough to be suitable for analogue or digital learning tools. Node's swivel seat and mobile casters mean every student can move to a position where they have open lines of sight to their teacher or other point of focus. Under-seat storage means the learning space can be reconfigured without first relocating everyone's bags, saving precious time by minimising disruption. The seat has a high, flexible back, with arm rests and a cushioned seat for comfort as well as a cupholder so water bottles can be kept within easy reach, making it easier to stay hydrated.

RAY

PERCHED, ELEVATED SITTING

The design principle behind RAY is centred around "perched" task work. In essence: if you sit and work on higher platforms to the traditional, your body will vastly improve its ability to self-balance, achieve a healthier posture, more-natural and frequent full-body movements, less slouching and neck flexion and improve hand-to-eye coordination during task work. A traditional school desk and chair set-up results in slouching and disastrous posture. RAY's perched and elevated seating position activates the core muscle groups, helps to evenly distribute weight and enables movements throughout the entire body.

Designer Simon Dennehy developed the concept for RAY during his Masters in Design at the National College of Art and Design in Dublin, Ireland, including his now patented concept of a flexible seat pan. When interviewing students as part of his research, Simon found they were very aware of their discomfort and the problems with their furniture set-up, and RAY's original aim was, and still is, to enhance the posture and well-being of students. RAY was launched by Labofa in 2012 at the ORGATEC furniture fair in Cologne and has grown in popularity throughout Scandinavia and the rest of Europe.

The collection now includes the RAY@WORK chair, which can be used for light task work in the workplace, universities and at home.

RUCKUS

FREEDOM OF MOVEMENT

As the move away from traditional classroom gathers pace, it's more common to see multiple styles of learning happening concurrently, so schools need furniture that can be configured and reconfigured rapidly to accommodate a variety of tasks. Ruckus is KI's response to this more-dynamic learning style, evolving from the design team's belief that if students are enabled to sit how they want and encouraged to move naturally, improvements in concentration, retention and engagement will follow, ultimately enhancing the learning experience. The company's research confirmed that students want to sit in "non-traditional" ways; something anyone who has witnessed the chair-tipping, side-saddling and desk-perching that occurs in most schools will instinctively agree with.

Ruckus also expresses the belief that there is a direct correlation between movement and cognitive development. While other chairs adjust to the user, Ruckus is designed so the user moves around the chair; they can sit forwards,

sideways or facing backwards, using the arm rests as a work ledge, as a perch or even simply as arm rests. This flexibility allows rapid shifts from collaborative group work to individual tasks and the perch-ability can quickly create a "tiered" classroom. Ruckus is available in a wide range of colours and specifications including a stack chair, four-leg version, with casters and with an upholstered seat.

TIP TON

ENCOURAGING A VARIETY OF SITTING POSITIONS TO KEEP BODY – AND MIND – ACTIVE

Celebrating its tenth anniversary in 2021, Vitra's Tip Ton chair was developed by British designers Edward Barber and Jay Ogersby, originally as part of a brief, in 2006, to provide furniture concepts for the Royal Society of Arts Academy in Tipton in the UK's West Midlands. Looking for suitable furniture, the design duo found a conspicuous lack of development in school seating since the Robin Day chair in 1963 and nothing that seemed to meet the requirements of twenty-first-century learning.

Barber and Ogersby compiled a list of the ergonomic, economic and aesthetic characteristics that they felt should be incorporated in a modern school chair for young students: indestructible, light, easy to produce, quiet, stackable, colourful and fully recyclable. And it should allow movement. This complex brief called for a revolutionary chair – for a new way of sitting.

Working with Vitra to develop the concept, 50 prototypes later the challenge of enabling the user to tilt and reach a stable position was solved and in 2011 the Tip Ton chair had arrived, its name expressing the dual seating positions as well as the name of the original project. Well on its way to becoming a design classic, Tip Ton can be found in home offices, gardens and around kitchen tables as well as in learning environments around the world. ■

THERE ARE RARELY **GOOD** OR **BAD** SCHOOLS, RATHER THERE ARE MORE OR LESS **EFFECTIVE CLASSROOMS.**

Peter Barrett, Emeritus Professor, University of Salford and Honorary Research Fellow, Department of Education, Oxford University.

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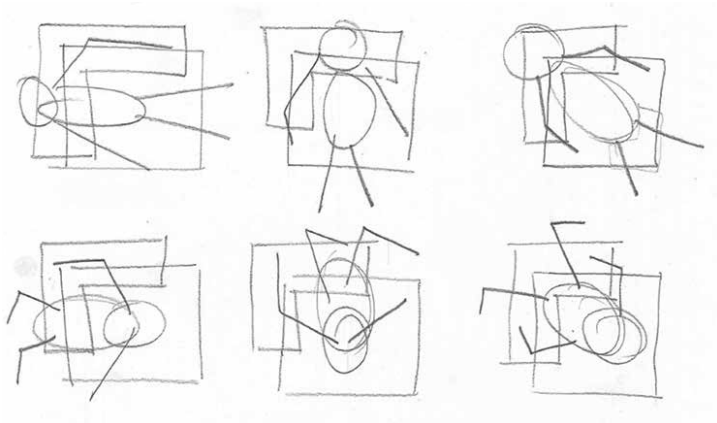
CREATING A RUCKUS IN CHAIR DESIGN

Ruckus, from KI, is designed to bring an element of controlled chaos into learning environments, so students can reap the benefits of movement in an environment that offers constant, stimulating change.



Back in 2014, KI's research on the effectiveness of learning environments recognised the need for more-engaging, -dynamic and -flexible spaces – and for furniture that was as student-centred and innovative as the curriculum. This research, in conjunction with observational work, drove the company to design a range of furniture that gives students the freedom of movement. The design team believed that if students were enabled to sit how they wanted and encouraged to move naturally, this would improve concentration, retention and engagement, ultimately enhancing the learning experience.

KI interviewed nearly 100 participants, including students, teachers, administrators and furniture dealers, to test their assumptions and to iterate the new chair design. By the end of this process the design team had confirmed that students wanted to sit in non-traditional ways in classroom chairs. The biggest engineering challenge was stability.

As well as offering multiple sitting positions, the backrest on Ruckus can be used as a perch. Safety is critical for school furniture and KI spent months finessing the position of the casters and the angle of the frame to ensure it was safe for children to use.

Launched in 2017, teachers reported that the new chairs allow them to "teach how they wanted to teach": not in rows but with lots of movement, with Ruckus enabling rapid shifts between various learning styles with minimal downtime for reconfiguring the space. Students could sit facing forwards, backwards, sideways, using the armrests as a work-ledge or as a perch, reaping the cognitive benefits of movement and comfort.

Since its launch the Ruckus collection has grown to include a stack and a four-leg version, stools and task chairs, as well as activity tables, lecterns and storage, and it continues to be a popular choice for schools looking to create dynamic learning spaces. ■

"STUDENTS COULD SIT FACING FORWARDS, BACKWARDS, SIDEWAYS, USING THE ARMRESTS AS A WORK-LEDGE OR AS A PERCH, REAPING THE COGNITIVE BENEFITS OF MOVEMENT AND COMFORT."

WHAT DOES IT TAKE TO DESIGN A CHAIR?

When "school seating" was first suggested to Simon Dennehy as a possible research area for his Masters in Design, he was, initially at least, somewhat underwhelmed by the idea. When he started visiting schools, his perspective changed.

After graduating from the National College of Art and Design in Dublin in 2003, Simon Dennehy was looking for an area of expertise for his Masters in which he could develop a body of research and build his career. As a former competitive road cyclist with a passion for bike components and human physiology, focusing on human movement in sports appealed, but a chat with his college lecturer, Dr Gearóid O'Conchubhair (who, for his PhD, designed a brilliant, bi-angular ergonomic chair for orchestral musicians), pointed Simon in the direction of school furniture.

Calls to action from ergonomic journals for better seating solutions for schoolchildren had gone unheeded, and, at the time, there was almost nothing of note available on the market. Underwhelmed by the design potential, Simon reluctantly began looking into it and began to appreciate just how widespread and serious the issue of poor posture in schools was. From the moment he stepped into his first classroom as a researcher and saw how poorly the students were sitting and working, he was hooked. Here, Simon explains the story behind the development of the RAY chair.

Back to school

"In 2006, I developed the concept for what would become the RAY school chair and desk system, by Labofa. RAY was a result of a two-year research Masters in Design, which was undertaken at the National College of Art and Design, in Dublin, Ireland, under the expert eye of Dr Gearóid O'Conchubhair.

"My work began by conducting several months of observational research with primary school students in classrooms around Ireland. I interviewed students, teachers and parents to gain an understanding of the main issues and frustration points with the current school furniture and researched the literature around best practice for school ergonomic furniture.

"I spent a long time sitting in classrooms and observing students throughout the school day, during my studies. One of the most striking observations I made was the fact that almost every student would slouch into a ball-like shape when reading or writing. Children sat in the most extreme and exaggerated of postures for hours, and as the day progressed it was very notable how their concentration and physical stature deteriorated.

"CHILDREN SAT IN THE MOST EXTREME AND EXAGGERATED OF POSTURES FOR HOURS, AND AS THE DAY PROGRESSED IT WAS VERY NOTABLE HOW THEIR CONCENTRATION AND PHYSICAL STATURE DETERIORATED."

"...SIT AND WORK ON HIGHER PLATFORMS TO THE TRADITIONAL AND YOUR BODY WILL VASTLY IMPROVE ITS ABILITY TO SELF-BALANCE..."

When interviewing the students, they were very aware of their discomfort and were very aware of the problems with their furniture set-up.

"The standard chair and table in a classroom are designed to hold students in a right-angled posture, where their lower-to-upper legs and legs-to-torso angles are all (approximately) 90 degrees, with a straight back and shoulders and upright head position. The chair usually slopes backwards slightly and the desk is almost always flat. For a student looking to learn to read or write, where they need the work close to their eyes, they have no option but to drop their head and bend their neck down, which in turn forces their back into a slouch, to the point where they are almost always hunched over their desks.

The design concept

"The core concept of the design is very simple and most of us can relate to the basic principle: sit and work on higher platforms to the traditional and your body will vastly improve its ability to self-balance, achieve a healthier posture, achieve more-natural and frequent full-body movements, require less slouching and neck flexion, and improve hand-to-eye coordination during task work.

"Perching activates the core muscle groups of the body and helps to distribute the weight and movements throughout the entire body. Importantly, it activates the leg muscle groups also, and in all our studies we found that students moved more frequently and with better overall postures, less head and neck flexion, and better pelvic rotation.

An elevated perch

"By the end of my research, I had invented the (now patented) concept of a flexible seat pan, for perched, elevated sitting, which was accompanied by a sloping writing table. The seat is rigid at the rear and down the centre towards the front – forming an almost bicycle saddle shape of rigidity – while the rest of the seat is firm, but flexible. The flexible region responds and re-forms around the user's requirements. Sit higher and it encourages leg separation for balance, and folds downwards; sit lower and the seat normalises and softly pads the underside of the upper leg. Because of the flexible seat design, the chair is positioned higher than traditional chairs, encouraging an elevated and perched sit. The table is also higher than normal, with an option for a sloped or flat surface.

"In 2009, shortly after graduating with a Masters degree, I met with well-established Danish designer Hans Thyge Raunkjaer at his studio in Norsminde, and also Benny, the director at Labofa, a very well-known furniture brand, with a strong history of ergonomic seating, in Scandinavia.

"There was a lot of excitement for developing the concept between us and showcasing the new developments in the Danish market. We all saw the importance of remaining true to the fundamental concept and providing an ergonomic design to enhance the posture and well-being of students. Hans and his team worked closely with us to bring the concept to life, as a truly beautiful piece of Danish/Irish design.

"In 2012, at the ORGATEC furniture fair in Cologne, Labofa launched the RAY collection of chairs, stools and tables to the world. Since then, it has grown in popularity throughout Scandinavia, and Europe. We have also added the RAY@WORK chair to the collection, which can be used for light task work in the workplace, universities and at home." ■

FURTHER READING

Mandal, A.C. *The Seated Man: Homo Sedens*, Dafnia Publications, Denmark, 1985.

Cranz, Galen. *The Chair: Rethinking Culture, Body, and Design*, W.W. Norton & Company, New York and London, 1998.

Irena Barker meets designers Avron and Jolene Levin, founders of NorvaNivel, to find out how their furniture designs tune into learners' needs.

"A LOT OF KIDS GET LOST IN THE SYSTEM BECAUSE THE ENVIRONMENT IS STIFLING THEM."

It is a brave business owner who describes himself as an "irrepressible lunatic" on his Twitter social media profile. But Avron Levin, the creative force behind the NorvaNivel educational furniture brand, clearly regards a degree of lunacy as an advantage in his trade.

"What I'm looking for all the time with my team is massive bursts of inspiration…I want the disruption in my classroom, the insane explosion of ideas," he says.

Curiosity, disruption and fearlessness are key to the Levins' design process – and these traits also reflect the kind of progressive education that the company wants its products to promote. It is a kind of education that prepares young people for the future by nurturing curiosity, giving them permission to make mistakes, learning to collaborate with others and develop a whole range of so-called "soft" skills.

"WE THRIVE ON FAILURE, IT'S LIKE THAT FIRST ATTEMPT IN LEARNING, YOU'RE ONLY GOING TO GET TO THAT LEVEL OF GREATNESS IF YOU HAVE STUMBLED AND FAILED ALONG THE WAY."

"...I WANT THE DISRUPTION IN MY CLASSROOM, THE INSANE EXPLOSION OF IDEAS..."

Avron's wife Jolene, co-founder and CEO of the business, adds: "We thrive on failure, it's like that first attempt in learning, you're only going to get to that level of greatness if you have stumbled and failed along the way."

A desire to make a difference

The seeds for the business were sown when Avron and Jolene first met in Johannesburg, South Africa, where Avron was living and working as a product designer and Jolene was visiting relatives. It wasn't long before Avron moved to Australia to be with Jolene; they set up a handyman business but quickly found themselves delivering and installing systems furniture.

One day in 2011 they were tasked with delivering chairs to a school that was pioneering a progressive approach. "The headteacher presented us with a problem around the lack of school furniture to support and facilitate future-focused pedagogy," says Jolene.

The headteacher said he needed 57 couches for his classrooms, something Avron – at the time at least – first regarded as "quite a commitment to a hippy kind of thing". But when Jolene started researching the problem, the couple saw there was a growing need. "We were already understanding that there was a movement in education," says Avron. "People were trying to make the difference but there was something missing, the environment wasn't supporting that."

They soon saw, says Jolene, that it could be an area where they could really make a difference. And it was this desire to make a difference that still drives the couple today.

Texas pioneers

In 2017 the couple and their four children moved, along with the company, to Texas in the USA – a country that is further behind Australia in terms of its embrace of learning environments that go against the industrial model of school.

"Conversations we were having in Australia are only now, four years on, starting to take foot here in the States; it felt like it was a good opportunity to be pioneering something in this country that was a little bit different but was really meaningful and impactful," says Jolene.

They soon saw this impact first-hand at a school that had used lots of NorvaNivel pieces inside its collaboration space. Their furniture had had a profound impact on a non-verbal, highly autistic boy who wouldn't interact with others. He was inspired to build "the most incredible train" using three or four different types of furniture, she says. "This little boy turned around, and when they went to take a picture of this incredible engineering marvel that he had done, he smiled for the photo and that kind of connection had never happened before with that boy."

Products that promote creativity

Avron and Jolene are obviously delighted to be having these kinds of real tangible impacts, but are there any products they have produced that they are particularly proud of?

Avron mentions the RockerOTT, an ottoman-style seat that resembles a Swiss roll with one flat side. It specifically helps children who find it helpful to fidget and rock as they learn.

He says: "We've got different favourites for different reasons. The RockerOTT is a big one, it was a realisation, a bit of an 'aha' moment and it also highlighted to us how simple it could be.

"We were doing a transport theme for Northern Beaches Christian School in Australia, so basically it was tugboats, trucks and trains. We knew we needed a surface, we wanted storage and we wanted seating.

"We wanted to put little ottomans that were light, but I put the ottoman down and it kind of kept rolling away, so I cut the bottom of the ottoman off and I put it down and thought 'that's awesome, that's like a solid wheel'.

"We put it into the environment and all hell broke loose [in a good way]: kids were sitting on it, straddling it, they were going mad, doing all these things – that was the intent, it was a happy accident."

But Avron's favourite product, he says, has to be Genga, a system of large sponge blocks that can be used in many ways.

"Purely because it is non-prescriptive and I'm always amazed at what people will do. There's an end to my creativity and somebody else carries on.

"The truth of Genga is it was designed to be a wall… I wanted to create a soundproof barrier. I kind of obsessed over materials; I was playing with foam, and it just made sense."

Jolene adds: "It's been the craziest thing. When we design a product, we might have an intention then put it inside a space, inside the hands of the child, and they will then take that and just perpetuate that creativity with that product in different ways – and ways that make sense to them."

Function as well as form

Avron is keen to correct anyone who thinks that the company's furniture is primarily about making a space "pretty" rather than having an important function. He gives the example of the "Cloudie" table, which looks fun, because it is cloud-shaped, but that shape has an important function in enabling collaboration between students.

He also highlights how having their own children has helped the couple in their journey towards understanding the importance of learning environments that cater for a diverse range of children who learn in different ways. "They are all so different. We have a kid from most groups. They test the product; they are brutally honest; sometimes they are far too kind," he says.

Jolene adds: "We've got one kid who's super creative, who in a traditional learning environment would not have her needs met properly.

"We've got another child, you could put her into a desk-and-row environment and she would function perfectly. You could put her into a NoraNivel learning environment too.

"It's about being in tune with kids' needs. A lot of kids get lost in the system because the environment is stifling them."

It is the recognition of this last point that clearly drives Avron and Jolene to help schools nurture the potential of all pupils in creative ways that will prepare them for the future. ■

We pour love, time, energy and money into our homes. But do we do the same for our schools and classrooms?
We should and must. Pupils spend more time in the classroom during the day than at home.

A learning space that has had time and energy invested to reflect the visions and values of a school will be an environment where a child will thrive. And a new study proves that learning outcomes will improve too.

Murray Hudson investigates.

THE CLASSROOM CONNECTION

Two years ago, Trumpington Park Primary School, in Cambridge, UK, was invited to participate in the Planning Learning Spaces in Practice (PLSiP) project; a new approach to learning space design which aligns physical learning environments with the school's educational vision, supporting children's personalised and independent learning. Headteacher Mel Shute and her staff were passionate about exploring the potential of "learning by enquiry", believing it could have a significant impact on improving the learning outcomes of students.

But how does a school translate its educational vision into the design of its learning spaces? How does a school ensure that its learning spaces match its ethos and enable the successful delivery of its vision and values? Is it through pedagogy? Classroom layout? The choice of furniture, fixtures and equipment? All of the above?

And most importantly, would this "hands-on" approach to creating their own learning environment produce quantifiably improved learning outcomes?

Professor Peter Barrett, author of the *Clever Classrooms* report was on board to monitor the impact on the pupils, teachers and support staff in Year 4.

A little bit of background

In October 2019, *Planning Learning Spaces* was published as a guide for anyone involved in the planning and design of learning environments. With expert contributors from across the global spectrum of education, architecture, design and FF&E, the book aimed to help inspire the design of more-effective learning spaces. In September 2020 the Planning Learning Spaces in Practice (PLSiP) project was launched to help schools translate their education vision into learning space design principles. The PLSiP team work with schools to create new, or refurbish existing, spaces so that they actively supported their learning goals.

Trumpington Park Primary headteacher Mel Shute explains: "We started from the heart of our ethos and our values, and looked at those in terms of what we wanted to achieve in our teaching and learning. Then we assessed the constraints of the current classrooms we have in being able to get that vision to work".

Terry White, Co-Director of PLSiP, continues: "Our methodology places learning and teaching at the heart of a reflective process that empowers schools and stakeholders to become the creators and not just the consumers of the design of spaces and places for future learning."

And then there's a pandemic

Despite the constraints, the design framework process continued through the pandemic, implementing Covid-19 safety measures and moving workshops online. Led by Co-Directors Terry White and Bhavini Pandya, the six workshops covered key themes of pedagogy, curriculum experience, organisation

of learning, leadership of learning and community engagement.

Staff reflected on their vision, values and ethos, reviewing whether they were evident in everyday learning and teaching practices while identifying strengths and challenges. Encouraged to define their next practice, staff then identified the learning behaviours and activities they hoped to see in the new spaces, considered how they would overcome potential challenges and what this might look like in terms of space and design.

After analysing their current and future practice ideas, the school and team developed a design brief that considered the learning activities and different zones that would be required.

The results are in

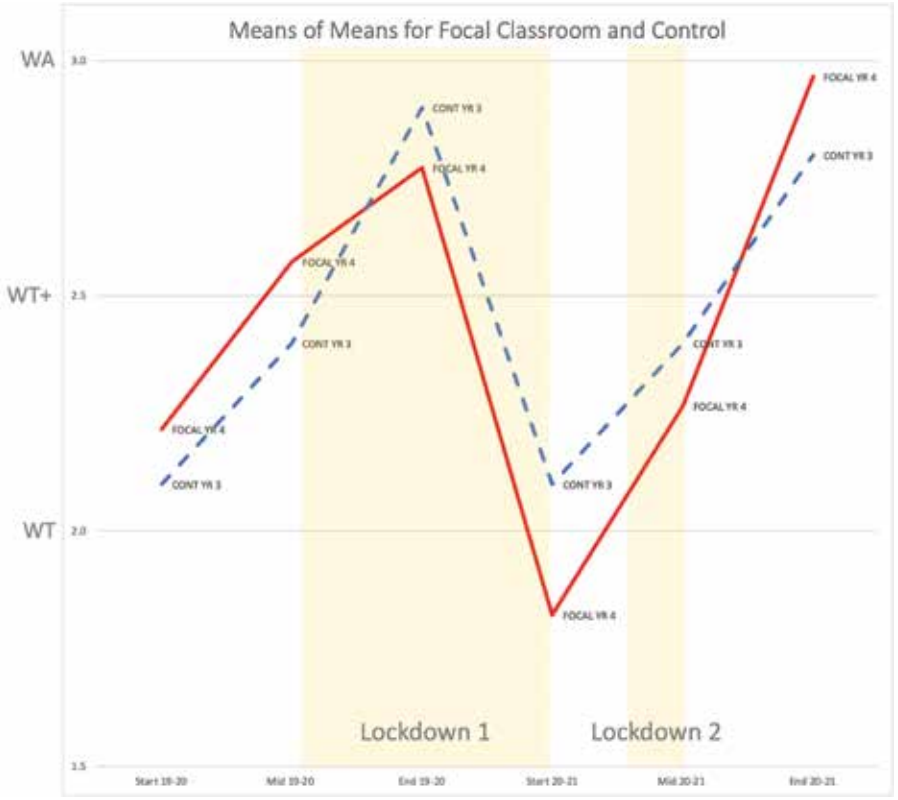
The key finding from Professor Peter Barrett's report was that in comparison with the other classes, the children in the PLSiP classroom rapidly regained ground lost due to Covid-19 and ended up ahead of where they were with age-adjusted assessments the previous year.

The teachers in the PLSiP classroom noted that there was improved concentration, increased independent learning, more engagement with curriculum content, more pupil dialogue and peer-to-peer learning:

BEFORE

- The ability to independently choose groups led to reduced conflict, promoted further independent learning and children's ownership within the process was more developed.
- The write-on surfaces and shape of the tables allowed much more pupil dialogue and peer-to-peer learning talk, achieving the goal of changing the balance between teacher talk and pupil dialogue.
- The pupil-led lesson structure has meant more engagement with curriculum content. Children are enquiring into their own interest areas and asking thought-provoking questions.
- Children are, at times, more able to provide help, support and challenge for each other.
- The furniture enables a much more flexible classroom and variety of teaching methods. As the tables move easily, no time is wasted reorganising spaces.

The pupils also had positive thoughts about their new learning spaces, feeling 'more free' and enjoying being able to work closely with peers and learning from each other. They appreciated the choice of different zones to work in and the variety of table and seating options.



GRAPH SHOWS ACADEMIC PROGRESS BASED ON AVERAGED TEST SCORES IN READING, WRITING AND MATHS FOR YEAR 4 (NEW CLASSROOM - SOLID RED LINE) COMPARED WITH YEAR 3 (OLD CLASSROOM - DOTTED BLUE LINE).

In conclusion

"The PLSiP process has without doubt led to a transformation in the appearance of the Year 4 learning environment," writes Professor Barrett in his report. "But, much more importantly, it is underpinned by a re-evaluation of the pedagogy and teaching practice to align more directly with the declared ethos of the school. There is good evidence that the project has had a positive impact from the perspectives of the pupils and of the staff. Overall, this is a success story that can be a sound basis for future developments."

Trumpington Park Primary is now moving into a "Strategy for Change" phase where the school will examine opportunities to embed the gains achieved through its engagement with PLSiP. ■

TIDY. IN 3D.

If you're designing a learning space and want to integrate Gratnells storage you can now find key products as 3D models in the SketchUp Warehouse.

Visit 3dwarehouse.sketchup.com and search for Gratnells.

AROUND THE WORLD, COMMUNITIES CAN SEE A GAP BETWEEN THEIR ASPIRATIONS FOR EDUCATION AND WHAT THEIR LEARNING ENVIRONMENT WAS DESIGNED TO DO.

RINGING THE END TO "CELLS-AND-BELLS" SCHOOL DESIGN

Narrow corridors dotted with boxy classrooms, creating an industrial and institutional feel, have long defined the typical school. Leading architects Fielding International has fought against this approach and is launching an app to show how it can be done better. Nathan Strenge, Senior Learning Designer at Fielding, explains...

Imagine a space where you feel a deep sense of comfort. Take a moment and create your own mental picture of that environment. How would you describe the space you're imagining? Are you indoors or outdoors? What sounds do you hear? What kind of lighting enhances the comfortable feel? Are there places to sit or lie that add to your level of comfort? Does the environment allow you to move freely about the space?

One final question: is the space you're imagining similar to any school you ever went to?

Chances are the school you attended wasn't designed to provide a deep sense of comfort; nor was it designed to promote interdisciplinary learning. It's doubtful that it was built to cultivate belonging, wellness or creativity, nor any number of the things we want from our schools today.

Around the world, communities can see a gap between their aspirations for education and what their learning environment was designed to do.

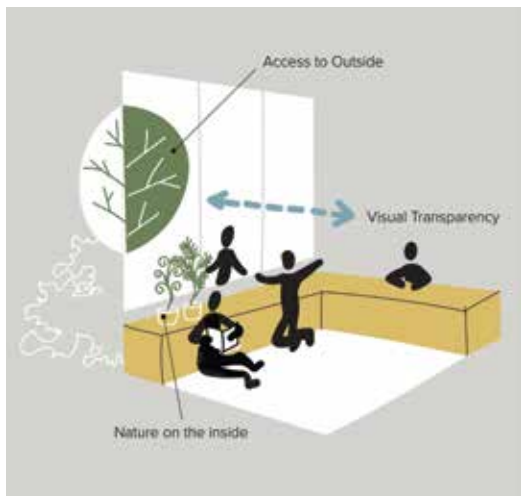
The problem challenge

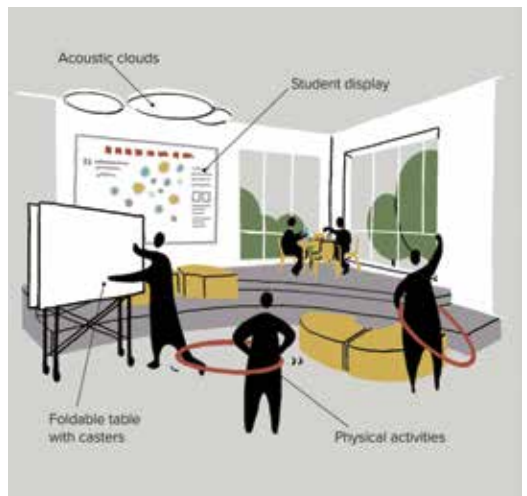
Throughout the twentieth century, facilities were largely structured around a "cells-and-bells" model – narrow corridors dotted with siloed classrooms, often creating an institutional or industrial feel, define this approach.

Despite efforts by schools to make learning more collaborative, active, interdisciplinary, creative – you name it – outdated school facilities are getting in the way of twenty-first-century learning goals.

And herein lies a critical problem. Because the cells-and-bells model rose to such prominence in twentieth-century school design, it's difficult for many to even imagine, let alone create, something markedly different.

So, despite a mismatch between conventional learning spaces and desired school goals, without the right language, tools and guidance, making a change presents an enormous challenge.





EDEN PARK - BEFORE

EDEN PARK - AFTER

The origins of Design Patterns

Randy Fielding – founding partner of Fielding International – felt the problem of institutional schools as early as kindergarten. He developed a belief that creating learning environments to foster belonging, creativity and collaboration could radically improve life on this planet.

In 1998, Fielding launched DesignShare, one of the first comprehensive websites on architecture and learning. Through DesignShare, Fielding gathered 500 case studies and published more than 100 articles on learner-centred learning environments.

As Fielding analysed this wealth of data, patterns emerged about how learning environments could support thriving individuals in flourishing communities. He started drawing Design Patterns as simple sketches with annotations that got down to the essence of how a space works to solve an identified problem. He noticed it was often just a few key ideas that would break down the complexity of school design.

By the time Fielding co-authored *The Language of School Design* in 2005, DesignShare was at the height of its influence. The 40 original Design Patterns formed the base of a new way of thinking about space in schools. DesignShare was the first to define the Learning Community model as a paradigm-shifting alternative to the dominant cells-and-bells approach.

The Language of School Design put Fielding in the spotlight as a rethinker of school spaces. Fielding International now has a global reach, working in 50 countries on six continents, and has won prestigious design honours such as A4LE's MacConnell Award.

In every project, Design Patterns have served as a common design language, helping users to effectively imagine and communicate what they want from their learning environment. They have repeatedly found that school communities that dig into Design Patterns with a local group – often composed of teachers, administrators, parents and students – have a breakthrough moment in creating a shared vision for teaching and learning that leads to transformational outcomes.

Scaling transformation

Yet, 23 years after DesignShare went live, only a small fraction of young people around the world are fortunate enough to go to schools designed to foster belonging, creativity and collaboration. This is why, in autumn 2021, Fielding International is launching a new Design Patterns open-source library app to help reshape schools for the better.

The app, put together by Fielding International's 35-strong team, aims to democratise best practices in twenty-first-century school design.

The team will launch the app with 70 Design Patterns; each pattern will include a statement describing the problem it aims to solve, how it solves it, along with an annotated sketch, images of the pattern in action and a "Go Deeper" section linking to pattern resources.

By making Design Patterns free and available for anyone to use, Fielding International hopes to spur demand for school environments that foster collaboration, creativity and belonging. With the common pattern language, Fielding International aspires to give everyone the tools and access to create locally sourced learning environments where all people thrive in flourishing communities.

Over time, interactive features will be developed on the app so people across the world can share ideas, suggest new patterns, add research and resources.

Bring it home

The need to create learning environments that are responsive to the unique and holistic needs of every user has never been clearer. Design Patterns can help you bring twenty-first-century learning environments to your community. Find them freely accessible at www.SchoolPatterns.com. ■

“WE BELIEVE THE FUTURE DOES NOT FIT THE CLASSROOMS OF THE PAST.”

Claire Sweeney is the Head of Junior School at Kelvinside Academy in Glasgow. Here she explains why she ripped up the rulebook of traditional classroom design to create an environment that focuses on play, relationships and actively engaging all learners.

If your child travelled back in time to a school in the Victorian era, their experience wouldn't be radically different from school today. The pattern of compliant children in long rows receiving information with the teacher deciding what, when and how things are learned hasn't changed. While the world has advanced considerably in every other way, our schools have a way to go to catch up.

If your child visited a school in Finland or Sweden, their experience would be radically different because of the strong pedagogical approach, which focuses on play and relationships, and allows for learning to take place through social interaction.

“BY GIVING PUPILS A SAY IN WHAT THEY LEARN AND HOW THEY LEARN IT, THEY BECOME ACTIVE PARTICIPANTS IN THE PROCESS.”

"OUR CLASSROOMS NOW FEEL LIKE COMPLETELY FLEXIBLE COLLABORATIVE SPACES, RATHER THAN CLASSROOMS."

Designing for interactivity

The way classrooms typically operate is a disservice to young people. Countless cognitive behaviour studies have shown how much better children learn when they are interacting, involved in the process, being appropriately challenged and having fun. We need to implement what has been learned from these studies and from our Scandinavian neighbours to help children develop the social and cognitive skills and competences they need to flourish in society, while their brain plasticity is at its peak.

We believe the future does not fit the classrooms of the past. That's why we chose to take action. We've ripped up the traditional classroom rulebook and started from scratch. Every single part of the design is there for a reason. Our classrooms now feel like completely flexible collaborative spaces, rather than classrooms. We've worked hard to create an environment that allows for different experiences every single day, where children can work together with their peers rather than be directed by a teacher. A place where they can question and challenge – not just accept things as they are.

Developing true understanding

Some children don't learn well at a desk. We believe children should be able to learn wherever they work best, whether that's on the floor with a laptop tray or on bleacher seats. Our new flexible environment also includes a mobile teaching station, so teachers can go to meet learners where they are, and reflection pods where pupils can go and think about what they've been working on before they move on to the next things. Children learn best when they are active in their learning. The environment is set up in such a way that the children are afforded different opportunities to work and collaborate with different people.

Working together with peers removes the hierarchy and allows for more cognitive conflict. This is how true understanding develops, as pupils are constantly rethinking rather than remembering. This process allows them to develop an array of skills, a basis of knowledge and to connect with the wider world.

Designing for interactivity and play

When Primary School education shifted towards "active learning" in the early 2000s, the concept was sound, but it was completely misinterpreted by schools. Simply moving around does not improve education, it's about the active engagement of a child's brain. By giving pupils a say in what they learn and how they learn it, they become active participants in the process. Presenting information and learning is not one-size-fits-all. By giving children autonomy and letting them choose it doesn't mean they won't learn how to read, write and be artistic. It just means they will learn in the way that engages them according to their own developmental abilities. The framework of the curriculum is broken; we want pupils to follow their own interests. We want to develop young people who are full of curiosity and wonder. The system that we had in place is creating compliant people.

As an adult you're allowed to get up and walk about in a workspace. By giving children the same freedom, we are teaching them self-regulation, which is vital for learning and life. We show our young people we trust them. Pupils don't ask permission to go to the toilet and we've found when we show trust in them, they don't abuse it.

A teacher could stand up and tell pupils how to share but in reality they'll only learn in the playground. So rather than leaving it to the playground, we create an environment where pupils can have real authentic experiences in the classroom. Many millions have been made by authors of self-improvement books educating their readers how to rediscover the ability to play, so why do we lose that in the first place? Classrooms are major culprits.

Growth mindset and mixed ability

Our teachers spend a significant portion of their time on personal development and all share a similar growth mindset. It's one of our values; that we invite challenge from pupils. If a lesson's boring, our teachers want to hear that feedback so they can continue to evolve their approach. What are we as teachers going to do to make sure pupils stay engaged? It certainly won't be telling them to sit still and nod for long periods of time.

Our classes are all mixed ability. Research shows that high-flyers will do well regardless, but if you take all the pupils who struggle in a subject and lump them together, these children are put in a box and their growth mindset and brain plasticity are reduced. It becomes a self-fulfilling prophecy. Pupils begin to tell themselves they aren't good enough at something, to stop trying. With mixed ability classes, pupils enter the zone of proximal development and are pushed to achieve more than they ever thought possible.

Our approach revolves around our fundamental belief that intelligence isn't fixed. So, we've created an environment where children can work together to improve as young people. From the moment pupils begin their early years education, we want to instil values and create an opportunity for pupils to follow their passions while developing all the social and cognitive skills they need. We have to be willing to challenge how things have been done in the past to develop pupils who can prosper in the future. ■

ARCHITECT: CATHY COOPER
CONTRACTOR: EAGLE CONTRACTING
FF&E LEARNITURE

"NOW THE NEW LEARNING HUB PHYSICALLY EMBODIES THIS: YOU SEE INTO THE LIBRARY AS YOU MOVE AROUND THE BUILDING, AND IT LITERALLY PLACES LEARNING AT THE HEART OF THE SCHOOL."

A SCHOOL WITH LEARNING AT ITS HEART

Michàl Cohen is a founding director of the award-winning Walters & Cohen Architects. Here, she shares the story of North London Collegiate School and its bold, contemporary, multi-purpose learning hub.

North London Collegiate School (NLCS) is a high-achieving academic all-through school in North London. In 2017 NLCS asked us to help with their junior school accommodation, specifically their ICT and music facilities, which were undersized. The school is located in a conservation area on Metropolitan Open Land and with listed buildings, so the extent to which we could build in open space on the site was very limited.

The NLCS Junior School had eight classrooms arranged around a courtyard, plus a hall, science lab, small ICT space, library and an art space shared with the younger pupils. Music is a popular subject, with every Junior School pupil studying at least one instrument. As a result of the learning hub project described below, the existing library has now been repurposed as the music space.

A new learning hub

Through discussions with the client, we concluded that the central courtyard was underused, since the school has beautiful grounds that pupils were using for outdoor recreation. We therefore suggested repurposing the courtyard by moving the library and two IT spaces into that area, placing those resources into the middle of the school where they could be easily accessed by the surrounding classrooms.

To fit everything in, we designed this as a two-storey space, with one of the IT spaces up on the first floor, overlooking the double-volume library. The linking of the library resources with the computer resources is a sign of the times.

Whereas the upstairs IT space is a separate, self-contained room with wired-in computers, the ground floor IT space functions differently. Working closely with the client, the decision was made to separate this off from the main library space using a large, sliding glazed door. This could be easily opened or closed, depending on how the school wants to use the space throughout the day.

It can work as an IT space, with a large interactive screen on the wall and laptops that are tidied away after the lesson; as an additional classroom for teaching any subject; or as a seamless extension to the library. It can also serve as an active space for teaching, learning or recreation, with the furniture moved aside; or it can be used as a gathering space for the hall, extending our brief by providing the foyer that the school lacked previously.

"THE MOBILE BOOKCASES, TABLES AND SEATING CAN QUICKLY BE MOVED TO OPEN UP THE SPACE, MAKING IT VERY FLEXIBLE FOR DIFFERENT TYPES OF ACTIVITIES AND LESSONS."

A flexible and light-filled space

The walls of the library are lined with books, alcove seats and places for presentations. The mobile bookcases, tables and seating can quickly be moved to open up the space, making it very flexible for different types of activities and lessons.

There is no daylight available at ground floor level because of the surrounding corridors and the hall, so we have provided clerestory windows on three sides, flooding the space with natural light.

The additional lighting for the library is suspended in the space and can be adapted if the school wants to change from the current spotlights to striplights in future.

The original layout had windows looking onto the courtyard from the corridors and hall, and we have kept those so that as you move around the school you can always see the library and the learning that is happening right in the middle of the school.

The double-volume space is new for the Junior School, which was previously a single-storey building. However, this part of the site has pitched roofs and the additional storey is only just taller than these.

We know from many years designing and building school projects that wooden floors are a popular choice. They feel good for younger pupils to sit on, they can be cleaned properly, and they create a warm and inviting space. At NLCS we extended the timber by using it on the walls as well, for the bookshelves and for the perforated panels that provide acoustic absorption.

For an academic school like NLCS, the love of learning is central to the ethos. Now the new learning hub physically embodies this: you see into the library as you move around the building, and it literally places learning at the heart of the school. ■

on reflection

BREATHING AND LEARNING

Everyone from The Hollies (if you're of a certain age) via Kate Bush to Ariana Grande seems to have sung about breathing and now, albeit belatedly, a number of governments around the world are waxing lyrical about it too. In Belgium, Ireland, Victoria state in Australia and even England we are hearing of centrally provided CO2 monitors going into at least some classrooms to meter the air inside.

Why the change of heart? Well, it probably wasn't the pop lyrics! CO2 has been touted as an interesting marker for viral aerosol infection. Covid droplets behave much like CO2. Good ventilation reduces them both.

Sub-optimal learning spaces hurt children's education

So, does low CO2 mean a great (and safe) learning space? Unfortunately, it is way more complex than that. In our Learnometer research project we have been logging the CO2, TVOCs (those nasty chemical Total Volatile Organic Compounds), PM2.5 (the little soot particulate matter associated with diesel engine exhausts), temperature, humidity, light and noise in learning spaces for well over half a decade. Generally, it is not good news.

If a school is anywhere near a busy road, as many are, then opening the windows might drop the CO2 levels, but that action will bring in all types of pollution. Sadly, good, published research confirms the impact of that on children's cognitive health and thus their academic performance: they drop an average of a year's schooling by the time they reach the end of school (no massive catch-up funding for them though!). Once temperature gets out of the "optimal" 18–21 degrees Celsius range, mathematics performance drops in a straight line. Each extra degree is equally additionally damaging. Poor light levels are demonstrably soporific, often stressful. Anything below 500 lux (use a free app on your phone) is so unfair on the students. Almost everywhere that we looked we found profoundly sub-optimal learning spaces.

Worse still, the poor behaviour, low attention levels and patchy performance associated with these damaging spaces ends up being blamed on the children. It is rarely their fault.

We've known all this for many years, and yet somehow it has taken a pandemic to draw attention to just one of those important variables. Probably this is like smoking: for decades people knew it was damaging, but somehow smoking carried on being normal everywhere from restaurants to school staffrooms. Eventually, slowly at first but then rapidly, smoke disappeared from pubs, offices, homes and public spaces. Maybe the pandemic is the small beginning that will, quite quickly, lead to us cleaning up the classroom atmosphere. The science is unequivocal, now we need architects, ministers, teachers and children to fight hard for learning spaces that let our learners be their very best selves.

I'm hopeful that change has begun.

Professor Stephen Heppell is CEO of Heppell.net and holds the Felipe Segovia Chair of Learning Innovation at Universidad Camilo José Cela, Madrid.