

Safe seats of learning

How good school furniture can make a difference



Foreword

The British Council for School Environments recognises the right of young people to learn in an environment which is safe, healthy and achieves the highest quality possible. We must all be committed to improving the quality, attractiveness and health of the learning and communal spaces in our schools. Environmental factors have significant effects on pupil and teacher well-being. Poor quality lighting, ventilation, acoustics and furniture all have a negative effect on student achievement and health.

What we value in our homes; we should value in our schools. What we wouldn't accept in our workplaces, should not be part of our schools.

Good school furniture can and does make a difference. As parents and pupils campaigned against 'turkey twizzler' type food so they will campaign against 'turkey twizzler' type furniture.

We must ensure that money spent on furniture is fit for purpose. The UK has suppliers willing to innovate and we must continue to invest in and design fit for purpose and flexible furniture.

Poor ergonomic design of classroom chairs can affect concentration, handwriting and general well-being.

We welcome the work of FIRA and this landmark document, 'Safe seats of Learning'.



Ty Goddard, Director
British Council for School Environments



British Council for School Environments

We as a nation are embarking upon a major investment in our schools and teaching methods - but our school furniture design has changed little from the post-war era. It's not just about aesthetics – good furniture has a positive effect on both children's health and their classroom development.

This call to action comes from FIRA (Furniture Industry Research Association) in response to requests from government, purchasers, parents, teachers and children to make a change.



Introduction

The present climate in schools is one of change and development. The Government has a vision of high quality, forward-looking school accommodation that will improve opportunities for students and produce a competitively skilled workforce for the 21st Century.

The current activity and the Government's ambitions to re-think schools as resources for the whole community offer significant opportunities to manufacturers and suppliers of school furniture. However, to date, the vision of designers, architects and educators has not been matched by a similar level of innovation from suppliers, with the result that many projects are failing to live up to the ambitious agenda set at the beginning of the tender process.

Unfortunately, school furniture often receives little consideration within overall project management, and detailed specification of furniture and equipment is often extremely vague. This has led to the selection of poorly designed or inappropriate products.

Now is the time to make a change. Furniture does not have to be stuck in the post war era. We call on architects, designers, specifiers, manufacturers, teachers and students to work together to create adaptable environments which:

- support the widest range of teaching and learning strategies,
- are efficient and sustainable,
- safeguard the well being of children,
- remove barriers to concentration, communication and information.

This document aims to stimulate specifiers to question the current methods used to select furniture and the rationale behind decisions made. At the same time, a collective approach is needed between designers, educators, manufacturers and specifiers to ensure furniture chosen today continues to suit tomorrow's schools.



With the exception of the introduction of polypropylene chairs in the 1970s, there has been no significant innovation in educational furniture in the last fifty years.



Rationale for change

Originally modelled on 'domestic' furniture as a liberal reaction to the perceived authoritarian connotations of traditional wooden desks, the design of school desks and chairs developed in the post-war years has failed to move beyond the mass production approaches of the mid 20th Century.

With the exception of the introduction of polypropylene chairs in the 1970s, there has been no significant innovation in educational furniture in the last fifty years. This has meant children have often been required to use unsuitable furniture and to work at mismatched tables and chairs.

Children are bigger and taller than they were thirty years ago, and research shows that most of this growth has been in the arms and legsⁱ. Not only are children changing, the classroom environment has changed dramatically and continues to evolve. Furniture needs to reflect the move from teacher-focused to learner-focused education and be flexible enough to respond to changing educational requirements.

Despite the changes in learning styles, children will continue to spend approximately 15,000 hours sitting down during their school years. Approximately 13 per cent of children aged 10-16 have significant incidence of recurrent back pain. This increases to adult levels by the age of 16ⁱⁱ. This can be attributed to a number of factors, including poor seating which does not match the size of the children, and tables provided at the wrong height.

"I am a pupil in year 10, and I have experienced back pain. I have also experienced back pain from the seats we use at school. It is obviously hard to get seats for all sizes, but the 'one size fits all' doesn't suit everyone, and it can become very awkward."

Matthew Wilson,
Age 14





"My back would often hurt for weeks on end, and it used to wake me up during the night. I would find it uncomfortable to do anything, even sit still for long periods of time. I found myself fidgeting in lessons at school and therefore missing out key information in class."

Ceri Symonds,
Age 13



It has been recognised for many years that traditional educational furniture does not fit the users. In 2005 the charity BackCare proposed:

'What is needed is a radical change in the way we think about and design classroom furniture and a sustained initiative to put into practice the lessons we've learned, not only from ergonomics research but also from the practical ways in which we observe our children using the furniture we give them'ⁱⁱⁱ.

In 2006 an early day motion was tabled at the House of Commons by Paul Burstow (Member of Parliament) and has been supported by a number of MP's including Vincent Cable. This motion increased awareness of the incidence of back pain in school children and called for changes to school furniture. "That this House expresses concern that around 10 per cent of teenagers are reporting back pain troublesome enough to visit their General Practitioner or a physical therapist with eight per

cent (up to three per class) reporting some disability from recurrent or chronic symptoms; notes that these complaints are being exacerbated in no small part by ill-fitting and lowest cost furniture within schools, lack of locker space resulting in heavy load-carrying and a lack of adequate exercise during the school day; further notes that these complaints affect the performance, self-esteem and relationships and participation in school and sporting activities of these young people and, if not corrected, will often develop into

longer-term back problems; further notes that much of this furniture currently used in schools, if used in the workplace, would be deemed illegal under existing health and safety legislation; and so calls upon the Government to facilitate the introduction of furniture into schools which is adjustable, can cater for the wide variation in height in a given age group and is ergonomically sound and conducive to a good sitting posture".



In conjunction with key stakeholders, this call to action identifies shortcomings and proposes solutions in furniture selection in four key areas:

Ergonomics

Fits the users

Teaching

Supports learning environments

Quality

Fit for purpose

Procurement

Easy to identify



Ergonomics



Size matters when selecting educational chairs and tables. Age and height considerations are often not reflected in furniture selection, and consequently the furniture is too big or too small. Furniture that does not fit the users will lead to restlessness and discomfort, resulting in a decreased attention span and reduction in learning potential. Children with long backs are more likely to suffer discomfort, particularly when desks are too low and they are forced to adopt a poor posture^{iv,v,vi,vii}. The combination of appropriately sized tables and chairs is critical for the wellbeing of our children. Ergonomic considerations will make a big difference in managing pupil discomfort. Children prefer ergonomically designed furniture to traditional furniture^{viii}. In addition small changes such as the introduction of sloping work surfaces and a less negatively raked seat angle have been shown to improve

sitting behaviour as well as increase children's satisfaction and comfort^{ix}. These improvements are not just when children are sitting. A recent study showed that personally adjustable school desks and chairs resulted in an immediate improvement in sitting posture and over time better standing posture as well^x.

Movement plays an important part in seating. Research has found that "a school in which movement is supported and encouraged has a positive effect on the learning ability and attentiveness of the children" (Dr Dieter Breithecker^{xi}). While office furniture has developed to allow dynamic sitting, school chairs continue to be very rigid. This lack of flexibility within chairs means the children create their own by leaning the chair back on two legs and frequently shifting their position on the chair.

Furniture must fit the children,
allow movement and encourage
good posture

The problem with sitting



When we stand the spine has a natural 'S' shape curve called lordosis.



When we sit in a slumped posture, the pelvis rotates backwards and the 'S' shape changes to a 'C' shape called kyphosis. This causes an increase in spinal disc pressure and results in back discomfort and pain.



To reduce the incidence and severity of low back pain when sitting a backrest with lumbar support in the correct position reduces low back stress by helping to maintain the natural 'S' shape.

Alternatively, increasing the angle between the body and legs to create a posture closer to standing will keep the pelvis in a forwards position promoting lordosis and preventing a 'C' shaped spine.

Teaching

Traditionally, teachers led in the classroom while pupils were taught. Teaching styles are changing and students now get individual pathways in a curriculum diet, learning through a variety of mediums. To support the latest teaching methods, **adaptability** in layouts is desirable.

Furniture should be easy to rearrange into a variety of configurations to move from group to individual work as required. Current furniture does not encourage the flexibility required to suit individual learning environments. Furniture needs to be designed to meet the needs of 21st Century pupils. It should integrate into both the building

design and the curriculum. "The classroom is like a theatre. Teachers are actors and pupils are spectators. Actors move around, spectators need to follow." (Levent Çağlar, Senior Consultant Ergonomist, FIRA). Chairs that can be moved and rotate quickly and quietly are the essence for changing designs.

In the UK teachers have ownership of their rooms, which means pupils of all ages may use them. The consequence is that one size of furniture will not fit all the pupils who use a classroom; they need furniture of different sizes or that can be adjusted to suit their varying dimensions.

Furniture must be adaptable –
easy to rearrange and reflect the
requirements of the curriculum





Quality

A child will sit on a chair for up to six hours a day over a period of 11 years or more. Furniture must therefore be durable and easy to clean and repair.

Cost is always a driver and in educational environments this is particularly acute as furniture is often the last purchase in a long building or refurbishment process. All too often it is seen as low status and/or purchased as an afterthought, with the consequence that the benefits of a new school are diminished by inappropriate furniture.

Based on purchase cost criteria alone, furniture can be unattractive, unergonomic and of poor design. The result is students feeling a lack of

ownership over the furniture, encouraging graffiti and vandalism, and shortening the life span. The majority of school chairs will need to last at least 10 years; therefore the cost per child for a cheap school chair can be as low as 60p per year. Although good furniture may carry a small cost premium, can we afford to ignore the benefits of providing high quality furniture that is suitable for all users?

Today's children are part of a design conscious society and this awareness extends to the furniture they use. Good furniture indicates that the purchaser respects the children; in return they are more likely to adopt a more positive attitude which is more conducive to learning.



Good furniture indicates that the purchaser respects the children

Furniture must be durable and encourage feelings of ownership

Furniture should be a metaphor for the curriculum, encouraging flexibility and creativity

It must be easy to access, identify and select fit for purpose furniture

Procurement

For a long time there has been a 'one size-fits all' approach to selection. The same furniture is chosen for all classrooms and other learning spaces across a variety of schools, resulting in furniture that is not task oriented.

While straightforward and simple, such a purchasing policy is inappropriate for today's 21st Century learning environments. Furniture should be fit for purpose. Most classroom chairs will not be suitable for library, laboratory or dining hall use. However, some furniture can be adapted for different purposes if it is designed with this clear goal in mind.

There is a need for better education of architects and designers to ensure understanding of how a specific learning environment works.

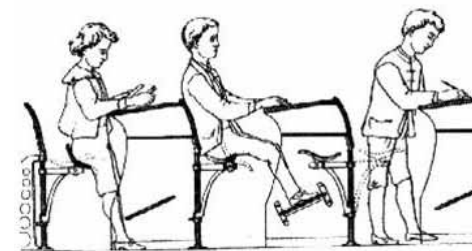


Collaboration between teachers, pupils and specifiers will ensure appropriate furniture is selected for different spaces.

Furniture purchases are dictated by what is available in the marketplace. In addition to long-standing educational furniture manufacturers, individual designers and other

furniture manufacturers are moving into the educational sector. This makes it more difficult for specifiers to identify and select furniture that is appropriate to them and highlights the importance of clearly identifying furniture that is suitable for tomorrow's schools. Furniture should be a metaphor for the curriculum, encouraging flexibility and creativity.

Adaptable school furniture is not necessarily new - it is all about knowing how to find it...



Sit-stand school furniture circa 1890^{xii}.

Benefits of Good Furniture

Benefits to Students

The specification and procurement of suitable furniture, fittings and equipment (FF&E) will support individual learning by encouraging different learning styles and stimulating students to manage their own learning. This will help students to spend appropriate time on tasks by ensuring the right furniture is provided to maximise concentration, communication and information. Learning spaces that combine appropriate products will achieve functional, aesthetic environments which reinforce the values and ethos of tomorrow's learning.

As a minimum, good furniture will safeguard the physical wellbeing of students through appropriate ergonomics and the ability to adjust to individual students' physical needs. Designers and stakeholders will seek to use design-led solutions to contribute to students' social, emotional and psychological welfare.

Adaptability in correctly specified furniture and equipment will support creativity, and help students to make the most of their working day.

Benefits to Staff

Furniture and equipment will support teaching staff by extending the possibilities for curriculum delivery and removing barriers to appropriate learning. Specifications should be designed to have a positive impact on classroom management, to create environments which increase productive learning time and encourage interaction between staff and students. In turn, suitable furniture and equipment will help contribute to the institutional message about the value placed on staff, students and the processes of teaching and learning.

Furniture will be flexible both within the subject area and within the individual lesson. Flexibility will also encourage staff and students to take responsibility for the appropriate choice of resources to promote creative teaching and learning experiences. Furniture and equipment will be designed to minimise time spent on setting up and arranging spaces, freeing teaching staff for curriculum delivery.

Benefits to Schools

Correct furniture and equipment will encourage excellence by facilitating the widest possible range of teaching and learning strategies, and so will address the personalised learning requirements of pupils in the 21st Century. Careful specification will ensure flexibility both in the use of resources by classroom staff to optimise curriculum delivery and over the longer term for the school to adapt to future needs. The use of good furniture will demonstrate best practice and innovation in the design of learning environments and promote interaction between teachers and pupils.

An investment in adaptable high quality, fit for purpose, ergonomic furniture which meets and exceeds British and European standards will save resources in the long-term while emphasising the value placed on learning by children, teachers and the community.

Conclusion

Poorly designed furniture is hampering the goals and ideals for tomorrow's learning environments. Furniture that meets the needs of children, teachers and schools and is well designed will provide real benefits for all. A change in direction is needed from the current cost driven approach towards selection which understands the needs and provides the flexibility required in today's learning environments.

FIRA urges those involved in the design, manufacture, selection and use of school furniture to work together to make sure the correct furniture is chosen for a specific learning environment. By taking into account the four key areas provided within this document - **ergonomics**, **teaching**, **quality** and **procurement** - specifiers will be able to identify furniture that is fit for the users and purpose.

We hope that this call to action raises awareness of the difficulties in selecting appropriate furniture and provides a framework for moving forward. This document was developed from discussions with key stakeholders involved in all aspects of school furniture. We see this document progressing over time and welcome your input and comments.

Bibliography

- i. Çaglar, L. (2001). Anthropometric Survey of School Children. FIRA, 2001.
- ii. Jones, M.A., Hitchen, P.J. and Stratton, G. (2001). Low back pain in children. *Pediatric Exercise Science* 316.
- iii. BackCare (2005). Your back in the Future: How School Furniture is ruining our children's physical health. Commissioned and published by Anthony Hill Designs Limited, June 2005.
- iv. Gardner, A. and Kelly, L (2005), Back Pain in Children & Young People. Published by The Backcare School Back Pain Group. Backcare The Charity for Healthy Backs.
- v. Fairbank, J.C., Pynsent, P.B. Van Poortvliet, J. A. and Phillips, H. (1984). Influence of anthropometric factors and joint laxity in the incidence of adolescent back pain. *Spine*, 9, 461-464.
- vi. Mandel, A.C. (1985). 'The Seated Man: Homo Sedens.' Dafnia Publications, Klapenborg. Denmark.
- vii. Nissien, M., Heliocaara, M., Seitsamo, J., Alaranta, H. and Poussa, M. (1994). Anthropometric measurements and the incidence of low back pain in a cohort of pubertal children. *Spine*, 19, 1367-1370.
- viii. Troussier, B., Tesniere, C., Fauconnier, J., Grison, J., Juvin, R. and Phelip, X. (1999). Comparative study of two different kinds of school furniture among children. *Ergonomics*, 42(3), 516-526.
- ix. Taylour, J. and Crawford, J. (1996). The potential use and measurement of alternative workstations in UK schools. *Contemporary Ergonomics*, 464-468.
- x. Koskelo, R., Vuorikari, K. and Hanninen, O. (2007). Sitting and standing postures are corrected by adjustable furniture with lowered muscle tension in high-school students. *Ergonomics*, 50(10), 1643-1656.
- xi. Breithecker, D. Physically active schoolchildren – alert heads. Teaching with exercise. Opportunities to improve performance and the ability to study. Federal working group on the development of posture and exercise e.V.
- xii. Gurr, K., Straker, L. and Moore, P. (1998). A history of seating in the Western World. *Ergonomics Australia*. 12(3), 23-32.

Pictures - courtesy of Community Playthings, Jacqueline Lightfoot (canburystudio.co.uk), Peter Hill at Bluevoice pgh, Isis Concepts and Stage Systems Limited.



FIRA International Ltd,

Maxwell Road, Stevenage,
Hertfordshire SG1 2EW, England.

Tel: +44 (0)1438 777700 Fax: +44 (0)1438 777800

E-mail: info@fira.co.uk Website: www.askfira.co.uk



Originally the Furniture Industry Research Association, **FIRA** is the UK research and technology organisation dedicated to furniture. **FIRA** is an independent organisation whose work includes the development of furniture standards, research, testing, and the provision of expert advice and support. The **FIRA** Ergonomics Unit has worked with the Department of Education since 1970 and has undertaken two major studies measuring children in 1971 and 2001¹. The most recent study was used in the development of the latest British and European furniture standards for educational institutions, and FIRA experts represent the UK on all European educational furniture standards committees.



FIRA's educational furniture experts are committed to the development of empowering, healthy and exciting learning environments which extend the possibilities of the school setting and meet the future needs of schools and communities.