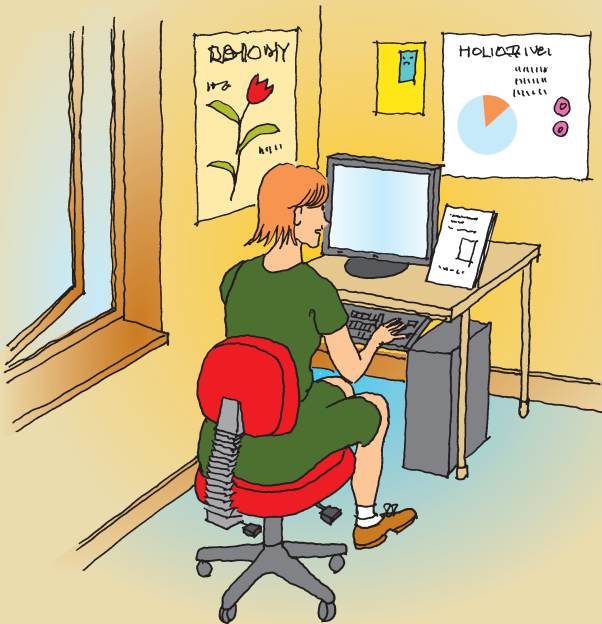


Designing Quality Learning Spaces: Introduction and Interior Design, Function and Aesthetics

Developed by BRANZ Ltd
for the Ministry of Education



Foreword from the Secretary for Education

Looking back on the past few decades, it's amazing to think how much New Zealand's education system and teaching practices have changed. Today, our classrooms and classes are lively, interactive hubs of discussion and debate, with active involvement from teachers and students alike. From a generally rigid teaching and learning framework, we have moved to one more focused on individual student's needs, helping them take those important steps towards a productive and rewarding future.

Yet for all this change, many of our classrooms and other learning spaces have remained much the same. This is perhaps inevitable – it can be easier to change approaches than to replace or upgrade buildings! However, I recognise that boards of trustees wish to provide the best quality modern learning environment for their students and teachers. There is also a need for better information and evidence to support the \$320 million annual capital investment programme for modernising and replacing the existing stock of school buildings.

In 2004 the Ministry of Education commissioned AC Nielsen Ltd to seek the views of designers, boards, principals, teachers and students on what they thought was important in the design of learning spaces. As a result of this work BRANZ Ltd was commissioned to provide advice for schools on the environmental aspects of the design of learning spaces.

This document – and the others in the series *Designing Quality Learning Spaces* – aims to help schools to create learning environments that are more appropriate for the 21st century. Developed through extensive research into international best practice, in consultation with experts and sector representatives, it provides in-depth and practical advice on improving quality of the internal learning environment ensuring your students and teachers enjoy effective communication and a more comfortable classroom.

The guidelines in this series cover acoustics, lighting, interior design, ventilation and air quality, and heating and insulation. Together they provide comprehensive information that I know will be useful for principals and boards of trustees as they go through the process of developing their ten year property plans to improve their school facilities and, through this, the effectiveness and value of the education they provide to students. Teachers will also find this information useful as they consider what contributes to a high quality learning environment. This is an exciting opportunity for us all, and we look forward to any feedback you may care to give us.



KAREN SEWELL

Secretary for Education

Editorial Note

This guideline on interior design is part of a series for boards of trustees, principals and teachers to help them understand the importance the internal environment plays in the design of quality learning spaces. It will also help boards of trustees brief consultants and tradespeople on their schools' requirements when planning new buildings, alterations or maintenance. Other topics in the series include: acoustics, ventilation and indoor air quality, lighting, and heating and insulation.

This section has two parts:

- the first is an Introduction to the series of guidelines *Designing Quality Learning Spaces* explaining their purpose and how to make best use of them
- the second looks at design, which covers function and aesthetics.

It is important to have the best possible internal environment in all learning spaces. If these spaces are not well designed they may impact students achieving their potential. The best learning spaces provide the closest match with the needs of all the students and teachers.

A school may look pleasing, but it must provide an effective teaching and learning environment. To function best, a space needs to be an enjoyable place to work in for all. The design of learning spaces is now evolving to a more flexible use of resources and layout of spaces – this affects all aspects of design.

Aesthetics involves all our senses – vision, touch, hearing, smell and emotions. Building and equipping a school presents a unique opportunity to use space, colour, form and light in design to inspire students and teachers.

Good design ensures the health, safety and learning of students are not undermined by ill-considered classroom layouts or badly designed furniture. Rising noise levels, inattention and poor learning can happen in rooms where some students cannot see or hear well or where there is overcrowding. Poor working postures from badly set-up workstations or inappropriately sized desks and chairs can also lead to tiredness, pain and muscular/skeletal health problems.

Designing a learning space that functions well, has a comfortable environment and is aesthetically pleasing is good for both students and teachers.

Other booklets in this series cover the practical aspects of providing clean air, a comfortable temperature and ideal conditions for seeing and hearing.

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INTRODUCTION TO DESIGNING QUALITY LEARNING SPACES



Introduction

The Ministry of Education has prepared a series of guidelines to help boards of trustees and principals to:

- assess the performance of existing teaching spaces
- be aware of the characteristics of quality learning spaces
- achieve the highest possible quality spaces.

This information is important because of the effect the teaching environment can have on student learning.

For this series, ‘environment’ refers to the quality of the learning environment which is affected by many physical factors including:

- acoustics
- air quality and ventilation
- heating and insulation
- lighting
- interior design, function and aesthetics.

These factors interact with one another: achieving good natural lighting must be balanced against possible uncomfortable heat gain from the sun, and the need for natural ventilation can clash with outside noise control efforts. No single factor should be altered without assessing its effect on all the others – a holistic approach is essential.

It is also important to spend the available money well (both the initial outlay and long term running and maintenance costs).

This series gives practical advice, but it cannot provide definitive answers for all circumstances. What

Designing Quality Learning Spaces can do is give advice which should improve teaching spaces for both students and teachers.

Although the main objective is to guide boards of trustees and principals, the series should also be available for teachers, to help them understand what makes a good learning environment and how they can contribute to this, such as by ensuring windows are opened for good ventilation. The guides can also be given to professional designers as part of their brief.

While the specific designs and solutions chosen will vary between schools, all quality learning spaces have certain features in common:

- there is always a fresh air supply which helps to prevent the build up of carbon dioxide levels, clears away pollutants, odours and excessive moisture, and improves comfort in warm weather by increasing air movement and removing heat
- there is a comfortable temperature regardless of outdoor conditions
- there is good lighting, preferably natural, without glare
- students can hear and understand the teacher from all parts of the room (and vice versa), teachers don’t need to raise their voices to be heard, and noise from outside doesn’t interfere with teaching.

In their design and layout, learning spaces should:

- allow the teacher to move about easily
- allow for a variety of teaching methods

- allow enough personal space for students
- let all the students see visual aids clearly
- provide work space for specialised activities
- cater for students with special education needs
- be safe and comfortable.

A quality learning space will have furniture which:

- allows learning and tasks to be carried out efficiently without fatigue
- helps protect students from injury owing to bad posture
- reduces the risk of distraction or fidgeting owing to discomfort.

Making Assessments

Using *Designing Quality Learning Spaces*

Each guideline in the series has a set of basic assessment questions designed to help teachers and principals evaluate the quality of their existing learning spaces and to get everyone involved (see Appendices).

Getting everyone involved

A participatory approach to design is recommended. Consult all users of the buildings, including staff and students. They are often very perceptive about what makes a good learning environment! Parents and the local community can also make valuable contributions. While often a time-consuming process, overseas

experience suggests consulting widely can be very beneficial.

Looking ahead

Teaching and learning has changed a lot in the last 30 years, but this is sometimes hard to detect when looking at existing spaces in many New Zealand schools. Apart from the introduction of some new technology, the spaces look much the same as they have always done. While traditional classroom design and layout may suit many teachers, a survey carried out by AC Nielsen for the Ministry of Education indicated teachers want spaces that enable a variety of teaching and learning practices to take place. It is important that the changes in teaching and learning, and the impact this has on design, is discussed as part of the planning process. This will show if the current spaces restrict teaching methods and whether a different range and size of spaces will benefit students and teachers more.

Discuss with teachers and students if the existing learning spaces are satisfactory or if changes need to be made to make teaching and learning more enjoyable and effective.

Looking for Solutions

Solutions from *Designing Quality Learning Spaces*

Having looked at all the factors affecting existing learning spaces you may be able to refine any major concerns to one or two basic issues, such as reducing outside noise or providing sun controls. You will hopefully be able to resolve these

by consulting one of the guidelines in the series: *Designing Quality Learning Spaces – Interior Design, Function and Aesthetics, Acoustics, Heating and Insulation, Ventilation and Indoor Air Quality, or Lighting*.

Help for complex problems

You may find there are more complex concerns eg, difficulty in balancing ventilation with heating requirements, intrusive noise or structural requirements. Get good professional advice because money spent on expert help at an early stage can save time and money in the long run.

Alterations and new buildings

Your assessment and the need for more space may lead you to think about building alterations, re-planning, extensions or new buildings. This work needs a building consent, and an architect must be used to carry out the design and to manage the approvals and building process.

The Design and Building Process

All the information you need for the design and building process is set out in the Ministry of Education's *Property Management Handbook*. This publication includes the Ministry's requirements for the management of capital works projects by boards of trustees and includes advice on:

- planning

- identifying what is needed
- setting the budget
- hiring and briefing the project manager and other consultants
- scoping and initial design concepts
- identifying the role of the board of trustees
- preparing the specification and tender documents
- calling for tenders
- the construction period.

Making it 'our building'

All users of the buildings should be encouraged to participate and communicate their ideas so that they feel part of the building process. If involved, they will understand where and why compromises have to be made and be more positive about the outcome.

Purpose and content of brief

The school should provide the architect with a brief, which is a recipe for what is required. Alternatively, the architect can prepare the brief based on discussions with the school and user groups. A brief should not be restrictive because it may be necessary to review items as a result of expert advice and as part of the design process. The brief should set out in detail what:

- the finished building will be used for
- standards of acoustics, air quality, heating and lighting are required.

Designing Quality Learning Spaces

provides much of this information. A brief may set ideals that are required without suggesting how they can be achieved – that is the architect's job.

Regulations – standards to meet

Most building work, however minor, will have to conform to the requirements of the New Zealand Building Code (NZBC). The NZBC covers a wide range of subjects including fire safety, moisture exclusion, heating, ventilation, lighting, plumbing and drainage, and access for people with disabilities.

Compliance with the NZBC is compulsory and this will dictate some areas of planning and design. At other times it may have minimum requirements which are inadequate for schools eg, the NZBC (at the time of writing) has no requirement for thermal insulation in schools but good insulation is necessary to achieve thermal comfort and energy efficiency.

Each guideline in the series has a chapter explaining the current NZBC requirements and setting out Ministry of Education requirements where these are higher.

Because the NZBC may have a large influence on what can and cannot be done, engage an expert at an early stage so time and effort is not wasted.

Value professional help

The design and building process is not a simple one. Achieving good acoustics, appropriate lighting levels and effective heating and ventilation all need expert knowledge. Because someone is involved in the building industry it does not necessarily make them experts in all these fields. Architects can advise on planning and design issues, but they also know when to call in additional expert help.

**Most building work
will have to conform
to the NZBC.**

Designing Quality Learning Spaces

Guidelines in the series are:

- **Introduction and Interior Design, Function and Aesthetics**
 - **Acoustics**
 - **Ventilation and Indoor Air Quality**
 - **Heating and Insulation**
 - **Lighting**
-

INTERIOR DESIGN, FUNCTION AND AESTHETICS



Editorial Note

What do we mean by design?

Other guidelines in this series explain how to achieve good ventilation, lighting, heating and acoustics for classrooms. The sum of these aspects of a teaching space environment is referred to as 'the ambience'.

This section considers the physical requirements for designing a quality learning space including:

- function
- size
- proportion
- shape
- technology
- finishes
- colour
- furniture and fittings
- interconnection with other spaces and outside
- flexibility.

Glossary of Terms used for Interior Design, Function and Aesthetics

Aesthetics	The study of beauty
Anthropometrics	The study of body measurements
Ergonomics	The study concerned with understanding the interaction between people and environmental systems and applying theory and data to design so that people's wellbeing and performance is optimised
FSC	Forest Stewardship Council
Holistic design	Targeting all the issues that affect the internal environment
Internal environment	The total conditions within which someone exists
Resilient flooring	Pliable sheet flooring materials (such as linoleum, vinyl or rubber)
VOCs	Volatile organic compounds (see <i>Designing Quality Learning Spaces – Ventilation and Indoor Air Quality</i>)

> SECTION 1

– Interior Design



Overview

When remodelling and upgrading spaces there is little point in investing significant funding to improve the internal ambience if the room is still not appropriate for modern teaching and learning or cannot accommodate new technology. A building may need major reshaping to make it function well and to achieve quality learning spaces.

Other teaching spaces may be fine for current teaching and learning but deficient in acoustics, heating or ventilation. Here the greatest benefit may be achieved by improving these aspects.

In providing new buildings the challenge is to achieve an excellent internal ambience as well as a design that is flexible and functions well for teaching and learning.

Many elements combine in the design of a classroom – the shape of a space, the impact of colour and texture, the layout of the furniture and its visual relationship to other spaces.

Physical needs

Classrooms should give a sense of place and belonging. They should be lively, but not over-stimulating, and have interest yet order.

Each school needs individual attention because one design solution does not fit all situations.

Other requirements will also challenge the designer and teacher, such as ensuring the layout and furniture:

- allows the teacher to move about easily
- gives enough personal space for students
- lets students see visual aids clearly eg, fixed or movable whiteboards and computer screens
- provides enough work space for specialist activities
- caters for students with special education needs
- is safe and comfortable.

Taking a holistic approach

Compromises may be needed when looking at all the aspects of the design of a quality learning space. This will depend on what the school, families and local community believe to be most important.

Often research and recommendations about school design focus on single issues, such as acoustics, air quality or natural lighting. They look at the impact of providing optimal conditions for one discipline without necessarily considering the impact on other design aspects. For example, introducing internal wall glazing has the advantage of improving lighting, making spaces seem larger and brighter. It allows for indirect supervision of students who may be working elsewhere independently, and it has also been suggested it changes behaviour patterns. However, it introduces a large non-acoustic absorbent wall surface and this makes the other aspects of an

acoustic design solution even more important when designing for the best acoustic outcome. More heat will be transferred through the glass walls than through a solid wall, and this can impact the comfort levels within the room, especially on cold days.

Being able to use a room in a variety of ways can also mean extra attention to:

- the impact of glare from sunlight on computer screens particularly laptops
- the sight lines to a fixed visual aid area if students use different seating arrangements.

Curtains can minimise heat build-up from the sun, but can restrict ventilation. Good designers who have been well briefed on your needs can address all these aspects in their design solution.

Classroom Size and Shape

Each school needs individual attention because one design solution does not fit all situations. The overall layout and design of the school will, to a large extent, dictate the possibilities for each classroom.

The teaching process

When designing new, or upgrading existing, buildings it is important that the size and shape of the space suits the activities in the room. Students have different learning needs and teachers have different methods of teaching. Encourage your architect to understand how the curriculum is taught and how the room is to be used so they can

arrive at innovative solutions. It is not important to have a regularly shaped rectangular room but it is desirable to have a classroom that:

- suits a variety of furniture and layouts where students are able to work on their own or in small or whole class groups or more
- allows teachers to move around the room and teach from any point
- is able to cope with new and emerging technology, such as laptops, data shows, interactive whiteboards
- has access to other supporting spaces that suit students working on their own
- has the best quality internal ambience
- has display space for students' work or education materials
- is close to (or combined with) storage and teacher support areas
- has access to storage for students' clothes and bags
- has access to social and recreation spaces
- considers the unique requirements of specialist subjects.

Size is determined by assessing the:

- maximum number of students for each room
- activities that will take place in the room
- ages and sizes of the students
- type of furniture used
- requirements for learners with mobility or special education needs
- possible future requirements.



Some examples

See the Ministry of Education website for good examples of new school designs and of remodelled teaching spaces in New Zealand schools: www.minedu.govt.nz/goto/schoolremodels. Also see the *OECD Programme of Education Buildings, Compendium of exemplary educational facilities 3rd Edition*.

Other examples can be found in the UK Department for Education and Skills booklets on the *Schools for the Future Programme*. Also see *The Language of School Design: Design Patterns for the 21st Century* by Prakash Nair and Randall Fielding or their website www.DesignShare.com.

Adapting for the future

We can best plan for the future by providing spaces that are easily adapted to changing circumstances. Spaces can do this when:

- they are open and not totally committed to one size and one layout
- the structure, ventilation, heating and electrical systems are easily modified.

Future technology will change classroom needs and teaching methods as computer technology has done in the last two decades. Learning spaces should be designed so they can be easily altered to meet these as yet unknown requirements.

Internal Layout

Space to move

The size, shape and flexibility of learning spaces are key factors in creating a positive learning environment. Cramped learning conditions, with spaces too small for the number of students and therefore unable to cope with a variety of teaching styles, are one of the main causes of concern about the design of the classrooms.¹ Desks should not be too close together and should allow for sufficient room for students to move about.

Space for movement (Figure 1) includes:

- circulation that allows the teacher to quickly approach any student no matter how a room is laid out
- room to stand close behind every student to discuss their work
- personal space.

Personal space

Personal space is an area with invisible boundaries. When another person intrudes into this space we feel uncomfortable, become defensive and tend to move away. The layout of desks and workplaces should recognise the need for personal space and this may be particularly important for female students.¹

It is difficult to be definitive about personal distance because the need varies with cultural background and how intimate we are with the person crossing the boundary. Table 1 gives some suggestions.

FIGURE 1 Desk layout and space requirement

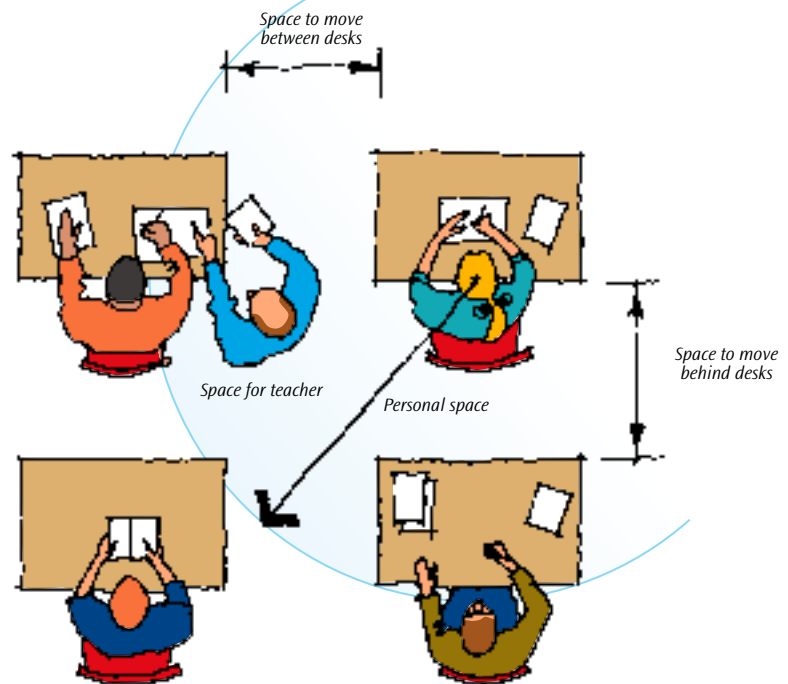


TABLE 1. Four communication distances²

Distance m	Appropriate relationships and activities	Sensory qualities
Less than 0.460	Intimate contacts, sports	Touch is the main means of communication. Intense sensory awareness
Personal 0.460 to 1.220	Close friends and acquaintances	Visual and verbal communication
Social distance 1.220 to 3.660	Impersonal, business-like contacts	Less detailed visual communication. Normal voice level. Touch not possible
Public distance more than 3.660	Formal contact eg, teacher to student in a classroom	No detailed visual communication. Exaggerated non-verbal communication to replace the subtle non-verbal communication of closer distances

The size, shape and flexibility of spaces are key for positive learning environments.

Sight lines

Students often complain of not being able to clearly see visual aids such as whiteboards and video screens. Glare is often the cause of a student's inability to see clearly (see *Designing Quality Learning Spaces – Lighting*). Another important factor is the angle of the sight line along which they are looking. Inability to see clearly may cause a student to adopt an uncomfortable posture and discomfort will result in loss of concentration. This is especially so with younger students whose angle of view (Figures 2 and 3) distorts the image even if there is no glare. Younger students (and those with some disabilities) are not always able to recognise the restriction, or fix it if they do.

FIGURE 2 Distortion of images at acute angles of sight

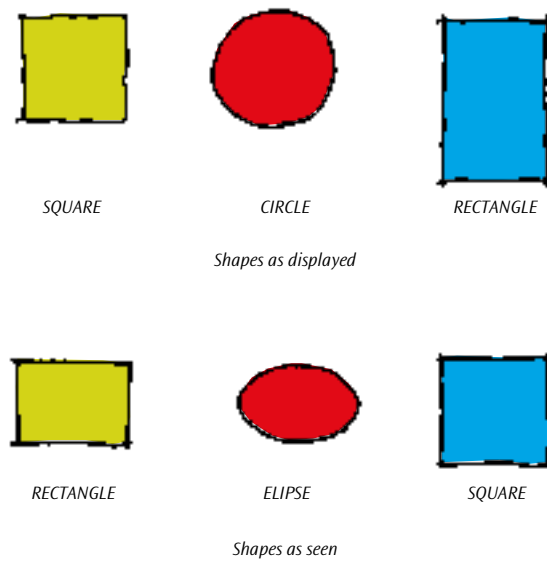
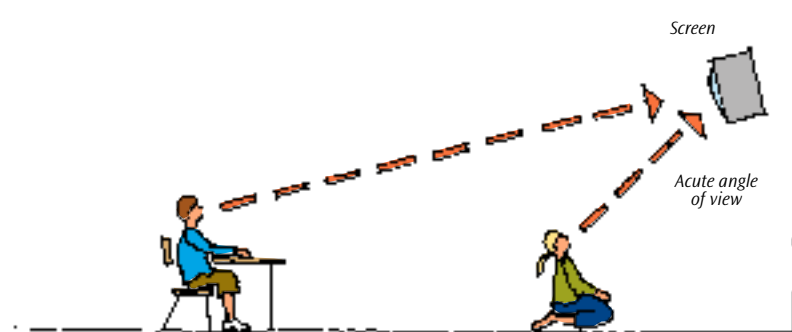


FIGURE 3 An acute viewing angle can distort the student's image of what they see

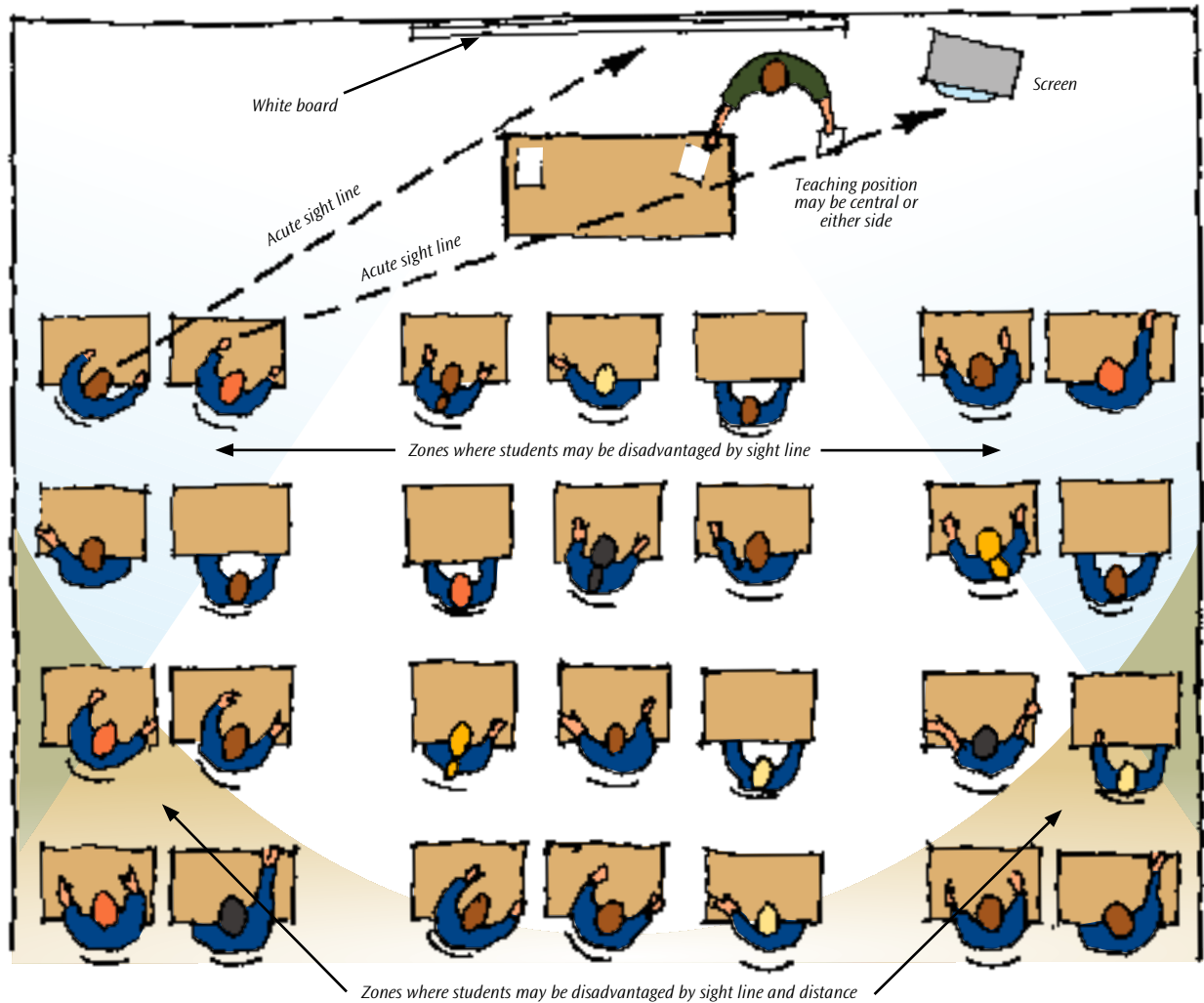


**Inability to see
may cause a
student to adopt
an uncomfortable
posture.**

There is some evidence that students who are located where the viewing angle is extreme, or the distance from the aid is excessive, are likely to have a poor learning outcome.³ If all students are to have equal educational opportunities, despite where they sit, pay close attention to seating layouts (Figure 4) so:

- the angle at which the teaching aid is viewed does not visually distort the students' understanding of what they see
- the distance from the teaching aid does not detract from their understanding of what they see and hear
- there is no glare.

Think about viewing angles of visual aids if the room design allows a variety of layouts for group working. Perhaps the aid itself could be moveable. Whiteboards that can be tilted forward at the top help to reduce glare.

FIGURE 4 The effect of sight line angles and distance

Acoustics and space

The acoustic quality of the room plays a vital role in learning (see *Designing Quality Learning Spaces – Acoustics*). Modern teaching and learning sometimes requires students to work cooperatively or in small groups. At these times noise level tends to rise.

Lighting

Interiors that are lively and pleasant sometimes have a quality that is difficult to define, but it is often owing to the careful use of light. Interiors with good lighting design help to promote the wellbeing of students and teachers. Indications

are that good natural lighting not only plays a major role in learning outcomes, but can also have an impact on health and attendance rates (see *Designing Quality Learning Spaces – Lighting*).⁴

Visual connection

The importance of an outside view from classrooms is explained in *Designing Quality Learning Spaces – Lighting*. Visual connections between classrooms and other rooms can provide interest and stimulation and are not necessarily a distraction to students (Figure 5).

FIGURE 5

Colour

There have been many studies on the effect of colour on the mind. Colour fashions come and go and we all have our own ideas about what we like. Some of the general effects are common knowledge – reds stimulate, yellow is cheerful, blues and greens are calming, cold colours recede and warm colours seem closer.

When choosing colour for schools:

- usually it only involves paint so it's not expensive to cover up mistakes or to make changes – use the need to repaint as an opportunity to experiment and liven things up
- play around with more daring colours in areas where students only pass through eg, corridors, toilets and changing rooms – try bright murals and logos

- use colour to 'code' sections of the school
- colours on the outside of the building are unlikely to have an effect on students in classrooms so they can be more stimulating
- perhaps the students themselves could contribute ideas
- remember the tone of the colour affects the lighting level in a room.

Students' colour preferences change as they mature. Young children seem to prefer bright primary colours, but while vivid hues may attract their attention they may not help learning.

Teenagers are more fashion-conscious and may prefer more subtle blues and greens punctuated by accents of brighter colours.⁹

Students' colour preferences change as they mature.

Selecting colours

Classrooms

- have light reflective surfaces – especially in darker rooms (see *Designing Quality Learning Spaces – Lighting*)
- children need to be stimulated but not over-stimulated – especially in the classroom
- the colourful work of students will always be on display – colours should emphasise or complement the work, not fight with it
- use muted natural colours and off-whites on the side walls of the classroom
- try using subtle brighter colours on the wall behind the teaching position – this attracts attention to the front of the class and the side walls provide a visual break
- use doors, pin-up panels and fabrics to give colour accents
- it takes skill to use colour well – get expert advice



> SECTION 2

– Finishes



Design factors

The choice of interior finishes in classrooms is critical to the overall design and appearance of the room. While appearance is important the final choice will be dictated by a range of factors, such as:

- cost
- wearing characteristics
- acoustic performance (see *Designing Quality Learning Spaces – Acoustics*)
- effect on air quality such as VOC (volatile organic compounds) emissions (see *Designing Quality Learning Spaces – Ventilation and Indoor Air Quality*)

- health and safety factors eg, slip resistance
- maintenance needs.

Flooring

Factors to think about when selecting flooring finishes are given below as guidelines only. Contact the manufacturer for detailed information on all finishes.

Table 2 gives an indication of the comparative costs of some flooring materials (Figure 6). Remember that price is generally a good indicator of quality – you get what you pay for.

FIGURE 6

TABLE 2: COMPARATIVE COST INDICATION OF FLOORING MATERIALS										
Material	Comparative cost indication including installation per square metre									
Paint – paving	1									
Paint – industrial		1								
Paint – epoxy enamel			1							
Vinyl – sheet				1						
Vinyl sheet – foam backed					1					
Linoleum – sheet						1				
Carpet – nylon							1			
Particleboard – 3 coats polyurethane								1		
Cork tiles – 3 coats polyurethane									1	
Gym floors										1
Carpet – wool tufted with underlay										1
Rubber – smooth sheet										1
Carpet tiles – nylon modular										1
Carpet tiles – wool modular										1
Rubber – stud patterned										1
Carpet – wool axminster with underlay										1
Ceramic quarry tiles										1
Timber strip – 3 coats polyurethane										1
Timber – parquet										1

Applied Finishes

Carpet

Sports Floors

Resilient

Timber-based

Ceramic

Type of sub-floor

Suspended timber floors	<ul style="list-style-type: none"> • don't use hard jointed flooring such as tiling if the floor deflects too much • defects in the sub-floor joints will show through and may crack resilient sheet finishes
Concrete slab floors	<ul style="list-style-type: none"> • new slabs must be dry before the flooring is laid – ignoring this risks failure of the adhesive or the flooring and losing your warranty • defects in the finish will show through resilient sheet finishes • cracks in the concrete will often crack the finish

Type of floor finish

See *Designing Quality Learning Spaces – Acoustics or Ventilation and Indoor Air Quality* for the acoustic and air quality factors for flooring.

Carpet generally	<ul style="list-style-type: none"> • gives thermal and physical comfort • has acoustic qualities no other flooring can give • needs vacuuming often • may give off VOCs when new • may harbour dust and dust mites • can allow mould to grow when damp
Wool or wool/nylon carpet	<ul style="list-style-type: none"> • available in a wide range of colours and textures • should be stuck directly to the floor for classroom use • may be used with a direct stick underlay to give extra resilience and to reduce the noise of footsteps • should be commercial grade for classroom use • is only suitable for dry areas • avoid wet cleaning
Modular carpets (Figure 7)	<ul style="list-style-type: none"> • have a heavy duty built-in backing • can be laid in patterns or with borders • damaged or worn sections are easily replaced • soiled sections can be removed for cleaning

FIGURE 7 Modular carpet design



Polypropylene carpet	<ul style="list-style-type: none"> • available in a wide range of colours • is hard wearing • may be used in wet areas or externally
Resilient flooring generally	<ul style="list-style-type: none"> • hard wearing • easy to clean and maintain • does not harbour dust, insects or mould • high reflectivity can enhance daylighting but also cause glare
Flexible PVC (vinyl) (Figures 8–9)	<ul style="list-style-type: none"> • will mirror an uneven sub-floor • suitable for wet areas • skirtings can be coved • joints can be sealed • PVC flooring and the adhesives used may give off VOCs when new • slip-resistant surface patterns available
Foam-backed PVC (vinyl)	<ul style="list-style-type: none"> • reduces the impact noise of footsteps • suitable for corridors and gyms
Linoleum (Figure 10)	<ul style="list-style-type: none"> • is manufactured from natural materials – very low VOC levels • hardens with age and may crack on uneven sub-floors • not suitable where water will lie on the surface
Rubber (Figure 11)	<ul style="list-style-type: none"> • low VOC levels • reduces the impact noise of footsteps • slip-resistant surface patterns available
Cork tiles	<ul style="list-style-type: none"> • natural material – no VOCs (but note some adhesives and coating materials may emit them) • available in a range of colours • suitable for moderate wear areas • will need re-coating
Timber (Figure 12)	<ul style="list-style-type: none"> • only get it from a renewable resource (eg, Forest Stewardship Council (FSC) certified) • available as strip planking, parquet and block • wearing characteristics depend on the species • adhesives and coatings may give off VOCs • very sensitive to moisture and changes in humidity • will need re-sanding and re-coating • high initial cost

FIGURE 8 Sheet vinyl



FIGURE 9 Sheet vinyl



FIGURE 10 Linoleum with inlay patterns



FIGURE 11 Rubber sheet



FIGURE 12 Parquet floor



FIGURE 13 Painted concrete

Ceramic flooring tiles

- very hard wearing
- suitable for wet areas
- no VOC emissions
- need a solid sub-floor
- available in slip-resistant finishes
- tiles easily cleaned but joints need special attention – low maintenance
- will not help sound absorption

Concrete (concrete floor slab used as a wearing surface) (Figure 13)

- very hard wearing with impact resistance
- suitable for wet areas
- static – no adverse health effects
- may be coloured, textured or polished
- may be coated with paving paints
- may be saw cut to give patterned joints
- concrete floors tend to crack unless special precautions are taken
- will not help sound absorption

Wall finishes

Wall finishes should:

- be durable, especially at low level where they are subject to high wear
- be easy to clean and maintain – many finishes will need re-coating
- contribute to a healthy indoor environment
- contribute to the acoustic absorbent quality of the room
- be visually comfortable.

Classrooms need plenty of pin-up or tack-up space for display and this will affect the overall appearance and performance of wall surfaces.

Type of internal lining substrate

Gypsum plasterboard systems

- gypsum plaster with paper linings both sides
- made to suit varying conditions including linings and fixing methods for:
 - wet areas
 - additional sound control
 - high impact areas
- thicknesses
 - 10 mm for standard use
 - 13 mm for additional robustness
- five levels of surface finish systems
 - there is an increased cost with each level so select the appropriate one

	<ul style="list-style-type: none"> • may not be suitable for low-level high-impact areas such as corridor walls • allows mould growth when damp • must have applied finish
Fibre-cement sheet	<ul style="list-style-type: none"> • cellulose fibre and cement sheets • two thicknesses <ul style="list-style-type: none"> – 4.5 mm for standard use – 6 mm for heavy duty use • usually a static material • must have applied finish
Plywood	<ul style="list-style-type: none"> • glue-bonded veneers • thicknesses from 7 to 20 mm • wide variety of finishes including: <ul style="list-style-type: none"> – smooth-sanded face – grooved to imitate boarding – sawn face • range of veneer species • can be bent to curved walls or ceilings • good impact resistance • may be left natural or coated with sealant or paint • may give off VOCs when new
Pre-finished fibre-cement sheet	<ul style="list-style-type: none"> • cellulose fibre and cement sheets with polyurethane coating • self-finished and easy to clean • suitable for wet areas and where hygiene is important
Reconstituted wood-based sheets generally	<ul style="list-style-type: none"> • manufactured from wood flakes bonded in resin • a wide range of products • not suitable for wet areas • joints must be expressed (eg, 'v' jointed) or covered by a batten • thicker sheets have good impact resistance • will give off VOCs when new • must have applied finish
Particleboard	<ul style="list-style-type: none"> • thickness from 9 to 30 mm • various face finishes • 9 to 12 mm sheets suitable for walls needing high impact resistance
Medium density fibreboard (MDF)	<ul style="list-style-type: none"> • thickness from 9 to 25 mm • generally a fine-grained appearance • can be bent • 9 to 12 mm sheets suitable for walls needing high impact resistance



Hardboard

- standard hardboard thicknesses
 - 4.75 mm
 - 6 mm for higher impact areas
- oil tempered water-resistant hardboard thickness:
 - 4.75 mm
- smooth or embossed finishes
- suitable for utility wall linings, such as storage areas

Soft board

- thickness 12 mm
- not recommended for wall or ceiling linings in schools
- suitable for pin-up boards with fabric covering

Timber boarding

- only get it from a renewable resource (eg, FSC certified)
- available in a wide range of profiles and thicknesses
- may be laid vertically, horizontally or diagonally
- coatings may give off VOCs
- sensitive to moisture and changes in humidity
- will need re-sanding and re-coating
- high initial cost

FIGURE 14 Profiled metal**FIGURE 15** Profiled metal**Profiled metal sheets**

(Figures 14 & 15)

- available in:
 - steel
 - aluminium
 - stainless steel
- range of profiles available
- range of finishes:
 - factory-applied colour
 - natural zinc/alloy coating
 - natural aluminium or stainless
- may be fixed horizontally or vertically
- suitable in wet areas
- easily cleaned
- easily replaced if damaged

Paints and coatings

Use the least toxic, low formaldehyde, low VOC paint that meets the substrate and durability requirements.

Substrate

Each type of surface to which the coating is to be applied has its own characteristics. It is critical to select the correct paint system using the manufacturer's recommendations.

Typical coatings

Floors generally	<ul style="list-style-type: none"> • need a heavy duty paint to give a durable wearing finish • most solvent-based coatings tend to be hard-wearing and give off toxic fumes and VOCs during application but these are low when cured
Flooring paint wear guide	<ul style="list-style-type: none"> • epoxies: excellent • polyurethanes: excellent • urethane acrylic varnish: fair • water-based acrylics: fair • oil-based: fair
Wall paint generally	<ul style="list-style-type: none"> • needs be hard-wearing especially up to head height • needs to have low sheen to avoid glare • generally water-based paints will: <ul style="list-style-type: none"> – give off lower VOCs – hold their colour well – be available with the right sheen level – be cost-effective – have enough wearing qualities for most areas

All learning spaces must have acoustic treatment.

Acoustic ceilings

All learning spaces must have acoustic treatment to the ceiling to reduce reverberation times (see *Designing Quality Learning Spaces –Acoustics*).

Research overwhelmingly shows that poor acoustics can have a major impact on students' abilities to hear, focus, concentrate and learn. Seek expert help if needed.

Selecting sound-absorbing ceilings

Suspended acoustic ceiling systems generally	<ul style="list-style-type: none"> • a metal ceiling tile support grid suspended from the roof structure or underside of an upper floor • tiles are inserted into the grid • tiles are available in a wide range of: <ul style="list-style-type: none"> – surface material – texture – colour – sound-absorption rating • high installation cost depending on quality of tile • can be retro-fitted with some loss of ceiling height in the room
---	--



Direct-fix acoustic ceiling

- mineral fibre tiles or panels are glued and stapled directly to a plasterboard substrate
- lower-cost installation
- can be retro-fitted

Purpose-built acoustic ceiling

- the ceiling finish is a material with a high proportion of gaps or holes, such as:
 - timber slats with gaps between
 - perforated metal
- the ceiling has a backing with high sound-absorption

Wood wool

- long wood shavings bound by cement into a rigid 50 mm thick board
- suitable for ceilings
- may be spray-painted
- good thermal insulation
- good sound-absorption properties

Doors

Doors are an opportunity to add colour and interest to teaching spaces.

Selecting doors

Flush solid doors

- see the *Designing Quality Learning Spaces – Acoustics* section for sound reduction factors
- are robust
- small glazed panels allow people entering the room to see when it is occupied
- use doors for a colour accent or to introduce a natural timber finish
- a low-cost option

Hollow core doors

- a low-cost option
- not robust and usually not suitable in teaching spaces

Framed doors

- may be timber or aluminium framed
- can be fully or partially glazed
- provide visual contact with other spaces
- may have glazed sidelights to enhance the visual connection
- a more expensive option

Fabrics

Selecting fabrics

Upholstery

- must be very hard-wearing
 - easy to clean
 - colour and texture must mask dirt and wear marks
 - it is not cost-effective to compromise on quality
-

Curtains

- choice will be dictated by function:
 - purely decorative
 - black-out
 - acoustic properties
 - heat insulation
 - hanging system must be very robust
 - could the fabrics for some areas be designed and printed by the students?
-



> SECTION 3

– Furniture and Fittings



Ergonomics and anthropometry

There is increasing awareness of the need for comfortable and appropriately designed furniture. Students rate comfortable furniture as a high priority in helping them to learn.

Ergonomics is a broad discipline. In the context of this guideline it means getting the best fit between students and teachers and their school activities, equipment and learning. The objective is to make learning spaces safe, comfortable, efficient and productive.

The ergonomics of classroom environments is about:

- seating arrangements
- viewing angles for whiteboards and other visual aids
- teaching positions
- chair and desk design
- computer workstation design.

Ergonomics also includes the measurement of students and teachers who come in all shapes and sizes (anthropometry). Taking anthropometry into consideration when designing or selecting school furniture is an important ergonomic factor.

Students don't always fit the furniture

A New Zealand study has shown that there is a high level of mismatch between the size of school furniture and anthropometric characteristics of students. 95% of the seats were too high and 48% too shallow. There is some evidence this mismatch is

a factor in the number of students with body discomfort and low back pain.⁶

There is also evidence that when students are forced to sit in conventional educational furniture they need to fidget and move constantly to make themselves more comfortable.⁷

Furniture should always fit the student

Students spend a large part of their day sitting down. The chairs and desks they use must be carefully chosen to ensure students:

- are protected from injury owing to bad posture
- are not distracted by fidgeting owing to discomfort
- can sit with comfort and carry out tasks efficiently without fatigue.

Student size and anthropometric measurements vary a lot within each school year so the 'one size fits all' rule cannot apply to chairs. Options are to provide:

- fully adjustable chairs
- a range of chair and desk sizes matched to the students' sizes.

One New Zealand manufacturer has researched and developed a system of ergonomically designed seating and desks (Figure 16) which have coded sizes to meet the needs of a wide range of students.⁸

Student sizes can change significantly within a school year.

FIGURE 16 An ergonomically designed classroom chair



Selecting classroom furniture

Chairs

- one size will not fit all students
- seats must not be so high that legs dangle – this puts pressure on the underside of the thigh and can affect blood circulation
- seats must be deep enough to fully support the thigh but with a gap at the back of the knees
- the front edge of the seat should be rounded to prevent pressure on the back of the knee
- the seat back should support the natural curve of the spine
- must be stable and discourage students from swinging back in them
- must have stacking ability
- there must be a minimum 20 mm clearance between the top of the thigh and the underside of desk

FIGURE 17 Storage unit



Desks

- give stability
- ensure enough clearance so larger students' thighs do not touch the underside
- ensure that the working surface is not so high that it causes students to lift (hunch up) their shoulders when writing or typing
- desks without storage give more leg clearance
- storage can be provided elsewhere if needed (Figure 17)

> SECTION 4

– Specialist Teaching Spaces



Computer Technology Rooms

Most classrooms have computers and many schools have dedicated computer suites.

Computer suites

Layout	<ul style="list-style-type: none"> • enough power outlets so wires don't trail across the floor – see <i>Ministry of Education ICT Infrastructure Standards</i> • avoid glare from windows – see <i>Designing Quality Learning Spaces – Lighting</i>
Suitable finishes	<ul style="list-style-type: none"> • floors: carpet, resilient flooring • walls: painted plasterboard with pin-ups • ceilings: acoustic tiles to give a low reverberation time • see <i>Designing Quality Learning Spaces – Acoustics</i> for advice on all acoustic finishes
Colour	<ul style="list-style-type: none"> • mid-tone colours often help to reduce contrast and glare • use small areas of dark, highly saturated colours for variety

Poor posture can cause pain and other symptoms.

Workstations and correct posture

The Ministry's *National Administrative Guidelines* require schools to provide a safe environment for students. Students who spend periods working on computers in the wrong posture are at risk. Poor posture can cause pain and other symptoms in the:¹⁰

- back
- neck and shoulders
- hands and wrists
- eyes.

There is no single 'ideal' (upright) sitting posture for using a keyboard. The ideal is to provide adjustable chairs, desks and workstations to make movement easy and provide good support for the body. These 'dynamic seating systems' encourage variety for comfortable seated postures and avoid the need to maintain fixed positions for long periods.

A school-specific website that exemplifies this concept has been developed by the New Zealand Ergonomics Society (NZES) Ergonomics in Schools Special Interest Group (ESSIG) with the Accident Compensation Corporation (ACC). It exemplifies dynamic seating concepts for students to go to:

www.moveit.org.nz

Students don't always have the correct equipment

A regional study carried out in all primary and secondary schools in Otago and Southland showed a high proportion of respondents were aware of these issues, but few took measures to reduce the risks. The study also showed that very few students used ergonomically designed furniture at school, especially at the primary level (Table 3).¹¹

Schools must not only be aware of workstation ergonomics, but also provide equipment so students can practise sensible work habits.

TABLE 3. Percentage of students using purpose-built furniture for computer work

	Primary school students	Secondary school students
Adjustable computer desk	5%	5%
Adjustable chair	7%	70%
Foot support	7%	10%
Screen filter	4%	15%
Paper holder	13%	57%

What should schools be doing?

Schools must not only be aware of computer workstation ergonomics, but must also help students understand and practise sensible work habits.

Ideally, when computer equipment purchases are planned, suitable workstations should be factored into the total cost. As a minimum this should include for each workstation:

- a chair with castors and adjustable seat and back
- an adjustable desk.

Where existing furniture is not adjustable and new furniture unaffordable, low budget adjustments should be made to reduce the risk of students developing computer-related injuries.

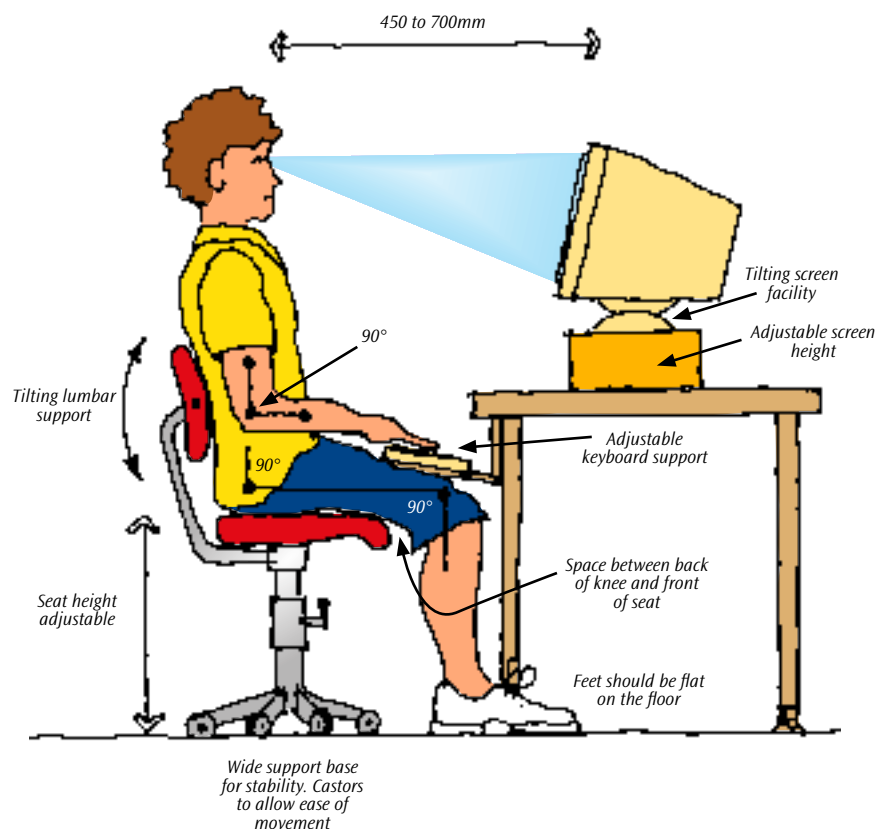


What makes a good workstation?

Important factors for keyboarding posture are: (Figure 18)

- upper and lower back are well-supported
- chair height is set so the seat does not pressure the back of the knees
- feet are firmly planted on a support (the floor or a footrest), not dangling
- the head is balanced upright on the neck, not thrust forward
- upper arms are close to the body
- limb angles are approximately 90° between:
 - shoulders, hips and knees
 - shoulders, elbows and wrists
 - hips, knees and feet
- wrists are level with forearms, give or take 15° with no tilt or sideways deviation
- the mouse can be moved by arm movement, not just the wrist
- having alternative input devices, such as a cable-free or pen type mouse, available

FIGURE 18 The ideal typing posture



Computer workstations

Selecting new workstations

- prioritise the workstation features that best suit the student's size and type of work they mostly do eg, good:
 - keyboard for word processing
 - mouse for surfing
- while all adjustable features are not essential, they will make the workstation suitable for a wider range of students
- the value of adjustable equipment is lost if students are not shown how to use it

Selecting chairs

- adjustable seats will suit a range of students
- seats that tilt backwards and forwards about 5° with a rounded front edge
- adjustable height backrests contoured to support the small of the back
- tilting backrests to support both working and resting posture
- swivel seats on a five castor base for stability
- if the seat and backrest do not adjust separately the angle between should be 105°

Selecting desks

- drop-down and height-adjustable keyboards are an advantage as they allow a wider range of users to sit in a variety of good postures
- if using desktop keyboards adjust the student's posture to give the correct forearm position

The monitor

- adjustable height and angle

How to improve an existing workstation

By using a few low-budget accessories and making simple alterations, it may be possible to make important improvements. These adjustments are all aimed at fitting the equipment to best match the individual students. They will help to reduce the risk of injury, but they are a stop-gap until purpose-made equipment is purchased.¹²

Improving existing workstations

'One size fits all' policy does not apply to computer workstations

- not all children are the same size (Figures 19-20)

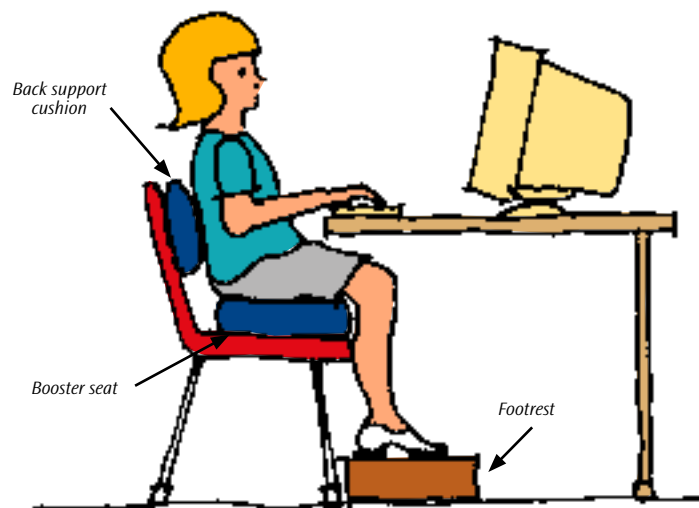
FIGURE 20 One size does not fit all



Keys to adjusting the workstation

- get as near as possible to the ideal for each student (Figure 21)

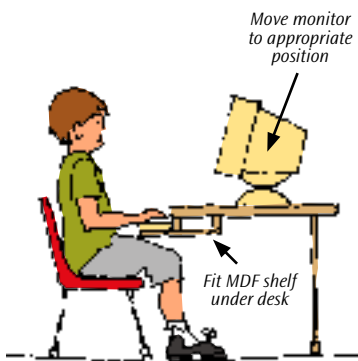
FIGURE 21 To correct 'dangling' legs



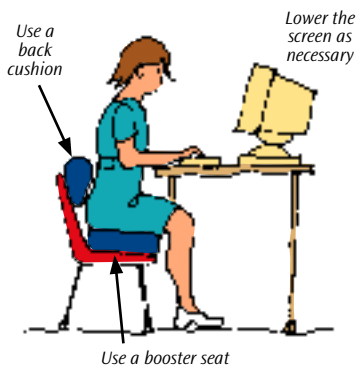
- use low-cost accessories to correct students' posture including:
 - a range of different thickness of hard foam booster seats
 - a range of different height MDF footrests
 - cushions to give extra back support where needed
 - adding MDF keyboard shelves to desks
 - providing document holders
- use different height desks and chairs to best advantage
- be innovative

FIGURE 19 Two friends from the same class



FIGURE 22 The keyboard is too high**FIGURE 23** Correcting the keyboard height**FIGURE 24** Making adjustments

The seat is too low

FIGURE 25 Making adjustments

Examples of postures caused by unsuitable furniture

Keyboard and monitor too high (Figure 22)

What to do about it

- use a booster seat or a higher chair and lower desk
- reduce the desk height (cut the legs down)
- fit an MDF shelf below the desktop level (Figure 23)

Students feet are 'dangling' (Figure 21, page 35)

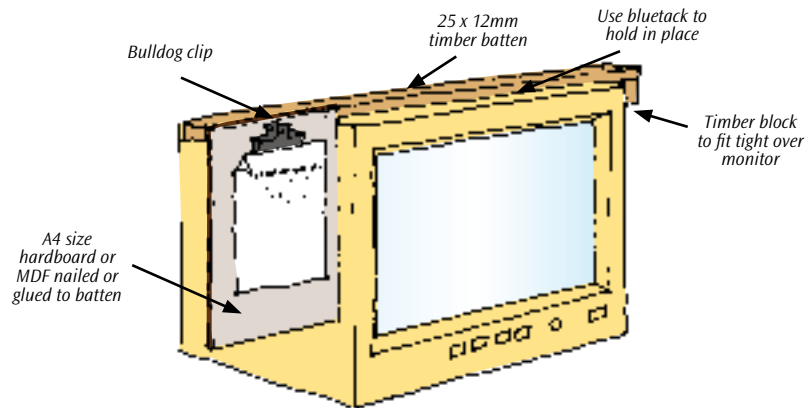
- use a footrest

Seat is too low (Figure 24)

- use a booster seat (Figure 25)

Student has to look down at copy material

- make a simple document holder (Figure 26)

FIGURE 26 Low-cost document holder

Student's back not well supported

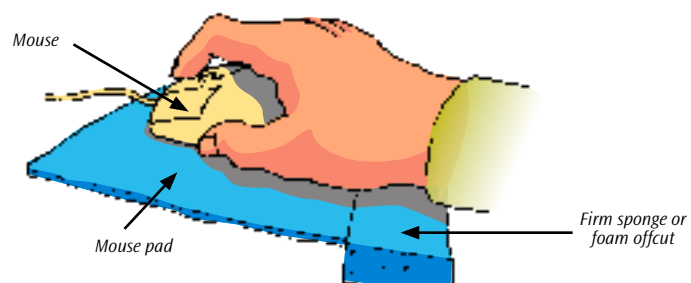
- tape a cushion or pillow to the chair back

Desktop has a shelf under it that does not allow enough room for the student's knees

- cut part of the shelf out

If the correct forearm position cannot be achieved or the student is using the mouse for long periods

- provide a wrist support (Figure 27)

FIGURE 27 Using a palm support

Laptop computers

Laptop computers are difficult to fit to students because:

- when the screen is at a suitable height the keyboard is too high
- when the keyboard is at the correct height the screen is too low
- the built-in pointing device makes it difficult for the arm to remain in a neutral position.

If students use laptop computers:

- reduce working times to short periods
- provide a low table that will allow the forearm to be horizontal
- place the keyboard at a comfortable distance and enlarge the font on the screen if necessary
- think about using a wireless or plug-in mouse
- for long periods provide a plug-in monitor and keyboard so the height and distance from the monitor can be adjusted
- use a variety of input devices to avoid holding the arm and wrist in fixed postures for long periods.

Multi-purpose Halls

Multi-purpose halls

Layout	<ul style="list-style-type: none"> • the various uses the room will be put to • the number of occupants the room can hold
Suitable finishes	<ul style="list-style-type: none"> • floors: resilient sheet, resilient foam-backed sheet, timber strip • walls: a variety of finishes to give acoustic variation ie: <ul style="list-style-type: none"> – painted plasterboard – timber panelling – timber slats with acoustic absorbent backing – plywood • ceilings: shape and finish to obtain the desired acoustic effect (see <i>Designing Quality Learning Spaces – Acoustics</i>) such as: <ul style="list-style-type: none"> – painted plasterboard – acoustic tiles – timber slats with acoustic absorbent backing – plywood • see <i>Designing Quality Learning Spaces – Acoustics</i> for advice on all acoustic finishes

Colour	<ul style="list-style-type: none"> warm or neutral tones and natural materials enlivened by bright fabrics and colour accents or murals
Furniture	<ul style="list-style-type: none"> furniture needs can be affected by the range of functions. Comfortable upholstered stacking chairs are usually needed. In smaller halls, stages and platforms made using modular boxes can provide flexibility and be moved and rearranged as needed

For more information on multi-purpose hall design see the Ministry of Education website: www.minedu.govt.nz/goto/performingarts

Gyms

Gyms



Sports floor

Layout	<ul style="list-style-type: none"> activities and sports the gym is to be used for number of students the gym can hold whether there is room for spectators
Suitable finishes	<ul style="list-style-type: none"> all finishes must be robust floors: resilient finishes eg: <ul style="list-style-type: none"> foam-backed resilient sheet timber strip on battens purpose-built sprung sports floors walls: <ul style="list-style-type: none"> plywood timber boarding particleboard painted fibre-cement ceilings <ul style="list-style-type: none"> this is usually the only place to obtain good acoustic absorption wood wool panels timber battens with gaps and acoustic absorbent backing perforated metal with acoustic absorbent backing see <i>Designing Quality Learning Spaces – Acoustics</i> for advice on all acoustic finishes
Colour	<ul style="list-style-type: none"> natural materials and neutral tones punctuated by strong bright colour accents

Libraries

Ask the National Library School Services, go to: www.natlib.govt.nz/schools about information on library design. School libraries should be comfortable and welcoming places.

Libraries

Size and layout

- number of books
- number of users
- activities of users
- audio visual presentations
- resource centre
- computer stations
- quiet study and individual reading spaces

Suitable finishes

- floors:
 - carpet
 - resilient flooring
- walls:
 - painted plasterboard with pin-ups
- ceilings:
 - acoustic tiles to give a low reverberation time
- see *Designing Quality Learning Spaces – Acoustics* for acoustic advice on finishes

Colour

- warm, bright colours
- relieve the book stacks with bright graphics

Furniture

- the issues desk should be carefully designed with hard-wearing surfaces, bright colours and be scaled to suit the size of the students
- comfortable low chairs and low tables are appropriate for casual reading
- position computers to avoid glare
- adjustable workstations with writing platforms for note-taking



Colour in a library



Music Rooms

The design and finishes should be balanced to enhance the acoustics (see *Designing Quality Learning Spaces – Acoustics*). This is design work that can only be carried out by an acoustics expert.

Music rooms

Size and layout

- various sized performance groups who will use them:
 - as individual practice rooms
 - as small ensemble rooms
 - for large orchestra and choir groups
- size, access and storage of instruments

Suitable finishes

- floors:
 - resilient flooring
 - carpet: depending on the acoustic requirement
- walls:
 - painted plasterboard with pin-ups
 - panels of different materials, such as profiled timber or perforated plywood, may be appropriate to enhance the acoustics
- ceilings:
 - painted plasterboard to give required reverberation
 - some absorbent finishes eg, acoustic tiles or timber slats with acoustic absorbent backing placed to achieve the required acoustics
- see *Designing Quality Learning Spaces – Acoustics* for acoustic advice on finishes

Colour

- mid-tone colours usually help to reduce contrast and glare
- small areas of dark, highly saturated colours for variety
- try bright graphics with a musical theme

Furniture

- ergonomic desks and chairs as for classrooms
- special ergonomic factors apply to chairs of seated musicians
- adjustable music stands are important

For more information on music room design see the Ministry of Education website: www.minedu.govt.nz/goto/performingarts

Design, Graphics and Art Rooms

Subjects such as design, graphics, art, food and materials technology increasingly use computer technology and provision needs to be made for data cabling.

Design, graphics and art rooms

Suitable finishes

- floors:
 - resilient flooring
- walls:
 - painted plasterboard with pin-ups
- ceilings:
 - acoustic tiles to give a low reverberation time
- see *Designing Quality Learning Spaces – Acoustics* for acoustic advice on finishes

Colour

- light, neutral colours and off-whites to maintain good light and not detract from the work
- colour accents from students' work displays and information graphics
- think about using fabrics designed and painted by students

Furniture

- ergonomically and anthropometrically appropriate work tables, workstations and chairs





Materials/Technology Rooms

Size and layout

- influenced by the:
 - number of students
 - type of work
 - size and type of equipment and machinery
 - materials to be stored
 - safety requirements

Suitable finishes

- robust hard-wearing finishes are appropriate
- floors:
 - resilient sheet
 - concrete (or concrete painted with industrial flooring paint with rubber mats at workstations)
- walls:
 - painted heavy-duty plasterboard
 - painted heavy-duty fibre-cement
 - particleboard
 - concrete masonry
- ceilings:
 - plasterboard with acoustic tiles or sound-absorbent panels to reduce reverberation time
- see *Designing Quality Learning Spaces – Acoustics* for acoustic advice on finishes

Colour

- light, neutral colours and off-whites to maintain good light and not detract from the work
- large brightly coloured graphics as features

Furniture

- ergonomically correct work tables, workstations and chairs

For more information on materials/technology room design see the Ministry of Education website:

www.minedu.govt.nz/goto/DesignofTechnologySpaces

Food Technology Rooms

Suitable finishes

- easily cleaned hygienic robust surfaces
- floors:
 - slip-resistant resilient sheet
 - slip-resistant ceramic tiles (for cooking areas)
 - concrete with an industrial slip-resistant finish
 - note that while slip-resistant finishes are safer they are more difficult to clean
- walls:
 - painted plasterboard
 - pre-finished fibre-cement sheets or ceramic wall tiles behind cooking areas
- ceilings: plasterboard with sound-absorbent perforated panels to reduce reverberation time
- see *Designing Quality Learning Spaces – Acoustics* for acoustic advice on finishes

Colour

- light, neutral colours and off-whites to maintain good light and not detract from the work
- large, brightly coloured graphics for accent

Furniture

- ergonomically correct and hygienic work tables, workstations and chairs

For more information on food technology room design see the Ministry of Education website: www.minedu.govt.nz/goto/DesignofTechnologySpaces

> SECTION 5

– Students with Special Education Needs



Schools for all people

Schools must ensure that buildings and equipment enrich rather than constrain the lives of students with special education needs. Ongoing evaluation is necessary to ensure your school continues to meet these needs.

Disability is the process which happens when one group of people create barriers by designing a world only for their way of living, taking no account of others' impairments.

The New Zealand Disability Strategy sets out the government's objectives in ensuring people with disabilities are catered for. Objective 3 is to provide the best education for people with disabilities by undertaking the following actions:

- 3.1 Ensure that no child is denied access to their local, regular school because of their impairment.
- 3.2 Support the development of effective communication by providing access to education in sign language, communication technologies and human aids.
- 3.3 Ensure that teachers and other educators understand the learning needs of disabled people.
- 3.4 Ensure that disabled students, families, teachers and other educators have equitable access to the resources available to meet their needs.

- 3.5 Facilitate opportunities for disabled students to make contact with their disabled peers in other schools.
- 3.6 Improve schools' responsiveness to and accountability for the needs of disabled students.
- 3.7 Promote appropriate and effective inclusive educational settings that will meet individual educational needs.
- 3.8 Improve post-compulsory education options for disabled people including: promoting best practice, providing career guidance, increasing life-long opportunities for learning and better aligning financial support with educational opportunities.

For more information go to:
www.moh.govt.nz

Planning ahead

Making provision for students with special education needs must be an integral part of a school's policies and practices. This provision must be considered at all stages of planning and construction of new buildings and refurbishments. Schools should take account of both existing and future students likely to attend the school. Generally, planning and design which makes provision for students with disabilities benefits all students and teachers.

Designing for students, or adults, with disabilities must cover a wide range of disabilities. These include:

- hearing impairment
- visual impairment
- physical difficulties

- emotional and behavioural difficulties
- learning difficulties.

It must not only consider their needs within the learning space but what the requirements beyond this are. This includes:

- site accessibility for drop off and pick up
- access around the site, and to and within the buildings
- signage
- toilets
- shower or change facilities
- safety and security.

Further information on designing for students with special education needs can be found in each of the *Designing Quality Learning Spaces – Acoustics, Ventilation and Indoor Air Quality, Heating and Insulation, and Lighting*. The wider accessibility requirements can be found in the Ministry of Education's publication *Property Modifications for Students with Special Needs*.

The following are the statutory requirements that apply for new and remodelled accommodation.

Statutory requirements (NZS 4121)

NZS 4121:2001 *Design for access and mobility: buildings and associated facilities* sets out requirements under the Building Act 2004 for the design of:

- buildings
- facilities within buildings
- driveways and car parks
- passages
- any associated landscaping
- access-ways for use by people with disabilities.

The requirements of NZS 4121 applies to educational buildings, including public and private primary, intermediate and secondary schools. This section only sets out requirements that affect classrooms and other teaching spaces (not those that apply to other parts of the school).

The requirements of NZS 4121 apply to all new buildings and to any alterations to existing buildings that require a Building Consent (in effect nearly all alterations and renovations).

Door visibility (NZS 4121. 4.10.4.1)

To help people find doors and operate the handles there must be contrast in lightness/darkness between the door and the:

- furniture (handles, keyhole plates etc)
- architrave frame or wall
- floor.

Entrance doors to classrooms (NZS 4121. 7.0)

Entrance doors to classrooms are also fire exits or ways outside. It is preferable that all entrances can be used by people with disabilities. To comply, external classroom doors must:

- be approached via a ramp with the right gradient and a level space 1200 mm x 1200 mm outside the door
- have a level threshold.

All classroom doors must:

- have a clear opening of 760 mm when the door is open
- have glazing that complies with NZS 4223: Part 3

- have clearly marked large panes if they could be mistaken for an opening
- be relatively easy to open if closers are fitted.

Door handles must:

- be between 900 and 1200 mm above floor level (1000 mm preferred)
- have lever handles.

Places of assembly and gyms (NZS 4121. 12.0)

People with disabilities must be able to go into rooms and areas used for meetings, entertainment, assembly and recreation. They should also be able to speak, lecture or entertain from the stage and have access to all facilities.

In an audience space provide:

- for a minimum of two wheelchairs to 250 places and one space for every additional 250 places
- wheelchair spaces next to normal seating
- adequate space so a wheelchair can be moved around
- a level surface.



> SECTION 6

– Planning New Buildings, Extensions and Remodelling



Ensuring Successful Design Outcomes

An architect or suitable qualified person is likely to be used to design new buildings or substantial alterations or extensions. Principals and boards of trustees should be aware of what is involved in designing functional and aesthetically pleasing teaching spaces. For a good outcome it is desirable that:

- boards of trustees realise:
 - the importance of the choice of the designer
 - that an innovative design will need bold decisions
 - that new buildings should look into the future for inspiration – not the past
 - the value of good aesthetics in school building
 - design is a holistic process bringing together all the factors raised in the *Designing Quality Learning Spaces* guidelines series.
- architects, designers and project managers understand the:
 - need for careful assessment of the school's needs
 - importance of a holistic and participatory approach to design
 - effect the design will have on student education for years to come
 - need to design for adaptability

- requirements of students with special education needs or people with access or mobility needs.

Monitoring the Design Process

Key principles

Principles that can be applied at the appropriate stages are set out in the Ministry of Education's *Property Management Handbook*.¹³

At the initial assessment stage

Consult widely with all users, including staff and students, to assess the need. Encourage discussion that looks at the existing strengths and weaknesses of the current facilities. Consider the curriculum and how it is taught, how students learn and how teachers teach. Look at what changes could occur with a different mix of property or design and layout of teaching space. Consider the access and mobility needs of 'all' users, including those who may use the learning spaces and buildings in the future. Prioritise your needs. Ensure your needs and visions for the future are clearly communicated to the architect in a written brief.

At the design stage

Ask the architect or designer to 'walk' you and the end users through the design proposals using perspective sketches or computer graphics. Formal plans and sections do not properly explain the spatial concepts of a design. Take note of end users concerns and if necessary make modifications. The design should include layouts of seating and furniture arrangements to show how the issues raised in this guideline will be met.

At practical completion

Carry out an evaluation with the users, staff and students to ensure there are no significant issues that need to be resolved. Identify what can be learned to enhance future projects. Ensure you have considered people with special education needs. Ask a person who is blind, uses sticks or a wheelchair to walk around the building with you.

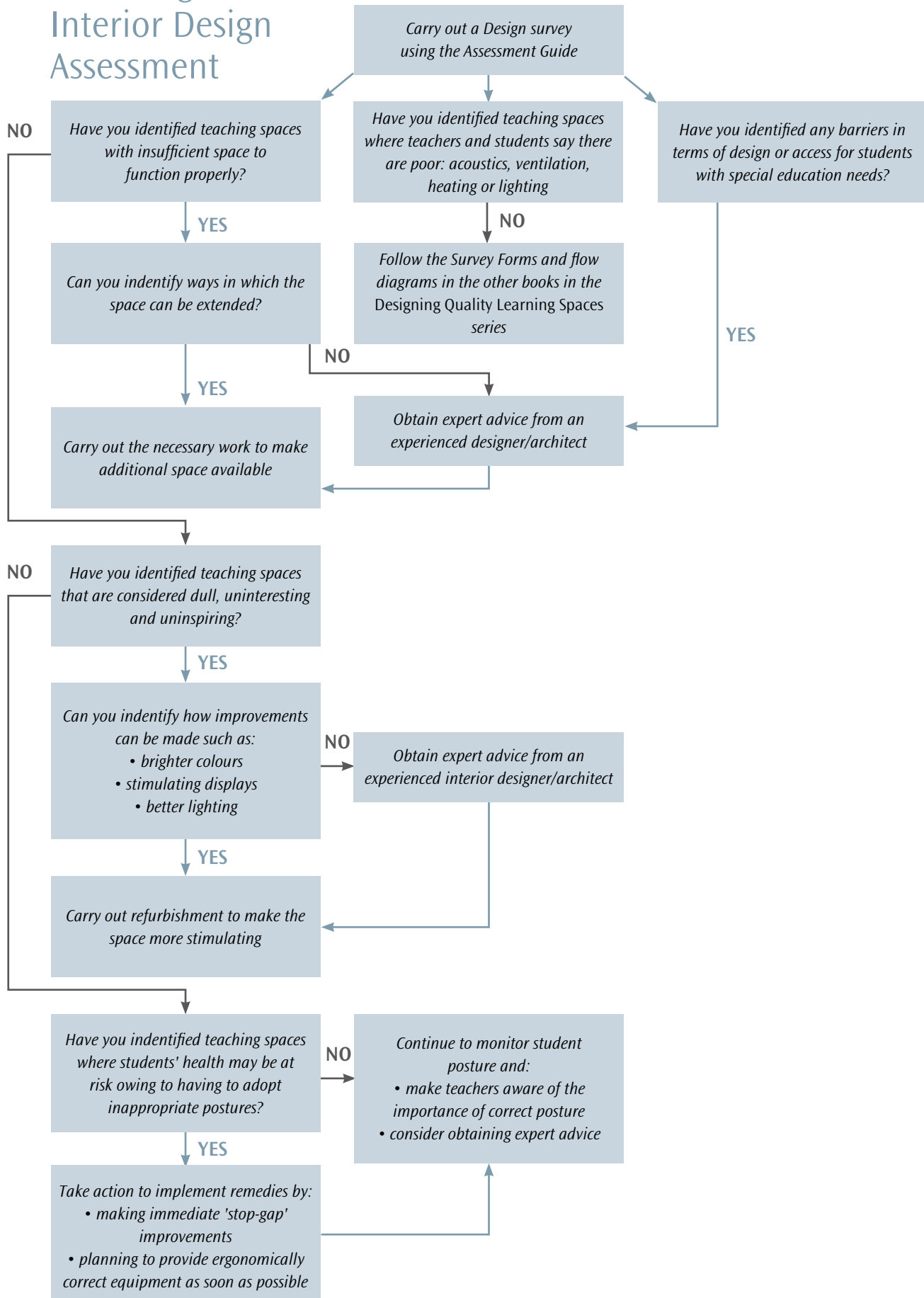


> APPENDICES

- Flow diagram for Interior Design Assessment
 - Interior Design Survey Form
 - References
-



Flow diagram for Interior Design Assessment



Interior Design Survey Form

Use this Survey Form to help you assess the aesthetics and functionality of your classrooms.

1. Do students and teachers think they have enough space to use the room in ways that suit their learning and teaching needs and activities?

Yes ☐ No ☐

Comment: If there is a predominant 'no' look at options to extend the space eg:

- an add-on space
- incorporating a store or corridor into the room
- joining two rooms
- a different arrangement of spaces.

2. Do all students see the whiteboard at an angle where they can read it? One way to assess this is to prepare a test board and check with students in every room.

Yes ☐ No ☐

Comment: Students who sit where they cannot clearly see the board are at a disadvantage. Think about ways the room can be re-arranged or use mobile boards.

3. Is the room able to support technology, such as computers, a data show or an interactive whiteboard?

Yes ☐ No ☐

Comment: Consider retro-fitting the space or include it as part of upgrading or remodelling.

4. Does the room meet the requirements set out in the earlier guidelines *Designing Quality Learning Spaces: Acoustics, Ventilation and Indoor Air Quality, Heating and Insulation, or Lighting*?

Yes ☐ No ☐

Comment: Use the checklists supplied in these other guidelines. If a classroom is deficient, prioritise and:

- fix those needing urgent attention
- deal with items that can be deferred as part of a total teaching space upgrade programme.

5. Can students with special education needs use this room without difficulty?

Yes ☐ No ☐

Comment: Establish and predict the requirements for current or future students with special education needs using the *Designing Quality Learning Spaces* guidelines and make sure they are included in your upgrade programme. If necessary consult with Ministry of Education, Special Education (GSE) for advice.

6. Can all students adopt a good working posture at their desk or computer workstation?

Yes ☐ No ☐

Comment: Remember there is no single ideal seated posture. Think about the potential impact on student health and work habits and make:

- stop-gap improvements that can be done straight away – refer also to the website at www.moveit.org.nz
- a plan to give every student ergonomically and anthropometrically correctly designed furniture and equipment
- all teachers and students aware of the issues involved.

7. Do students and teachers think the room looks:

- ☐ dull
- ☐ fairly interesting
- ☐ stimulating
- ☐ fantastic?

Comment: 'Dull' and 'fairly interesting' are not good enough. How do students think improvements could be made with:

- colour
- more light
- better displays?

Make sure that stimulation is not over done.

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