a practical review of design in Scotland's newest secondary schools

LESSONS LEARNT

SCOTTISH FUTURES TRUST

1 - Introduction

In June 2009 the Scottish Government (SG) announced details of the next phase of major schools investment and the Scottish Futures Trust (SFT) has been asked to co-ordinate the delivery of the new programme. The key objective for SFT is to drive Value for Money (VfM) across the programme of investment by reducing overall programme transaction costs by minimising duplication of activities.

SFT decided that a logical starting point to a £1bn investment programme would be to take stock of both what has been delivered in terms of the physical characteristics of new and recently opened schools buildings and what lessons could be taken into consideration in the design of future new schools.

In all of the 28 schools reviewed both staff and pupils expressed a huge degree of satisfaction with their schools and were clearly very proud of the new buildings. All of the new school buildings visited were generally of a very high standard and quality, and this view was shared by all the users, whether pupils, staff or members of the wider community where appropriate.

This 'Lessons Learnt' document is the outcome of the taking stock exercise collating user experiences into a central pool of information in order to further facilitate continuous improvement and to allow application of the lessons learnt in the schools' programme pilot project[1]. In addition to the pilot project, the lessons learnt document will be made available to all those involved in designing secondary schools.

Purpose

A school is a very specific building type which raises many challenges for designers and for those who manage them. There is no other building type where nearly every member of the building's population change location and move from one room to another at least five times during every day, and where the majority of the building's population are under the age of eighteen. Individual authorities have been carrying out Post Occupancy Evaluation exercises at a local level, however the results have not been widely shared. SG together with Architecture and Design Scotland (A+DS) have also highlighted best practise in a number of case studies. The purpose of this exercise has been to draw together lessons learnt from previous projects highlighting successful solutions and drawing attention to areas where further development is required in order for new school buildings to better meet user requirements.

The findings in this report, together with emerging energy efficiency and carbon reduction requirements, will support the briefing of the schools pilot project. The pilot project, with support from SFT, A+DS, the Carbon Trust (CT), Learning & Teaching Scotland (LTS), and Grounds for Learning (GfL), will provide a tangible output in the form of 'a development handbook' including generic

[1] The pilot project is a combined procurement between Midlothian Council and East Renfrewshire Council

exemplar designs and fully developed overarching technical requirements that SFT will share with others involved in the secondary schools programme. Sharing this information will provide the opportunity to identify commonalities and streamline the design development process, creating opportunities for efficiencies among procuring local authorities. This approach will continue to provide local choice and flexibility while facilitating the sharing of good practice in order to enhance value for money.

Methodology

SFT surveyed 28 new secondary school buildings by visiting the schools and interviewing senior management teams, facilities management staff and student representatives. These schools were across 16 LAs with different educational and design approaches and had been operational for at least six months ranging from one school having opened in 2002 and 2006 respectively, six in 2007, 12 in 2008 and eight in 2009. In parallel SFT engaged the services of an experienced architect to help review how the schools were briefed in the relevant authority requirements. The correlation of user feedback and specification documentation allows lessons to be drawn out that can help inform future specification documents. SFT has involved the Carbon Trust in the overall review of findings to help draw out the relevant points to consider, particularly in terms of energy efficiency.

It is important to note that there has been no attempt by SFT to review buildings against a specific benchmark. Equally, SFT has not reviewed any guidance for school buildings and any specific references in this document to any guidance appear simply where these were highlighted in the project documentation reviewed. This document collates and summarises the feedback received from different user groups and attempts to highlight issues for consideration. This document is designed to be of use to anyone developing schools and is to stimulate discussion as well as to act as a checklist for both Clients and designers as part of their normal design development process.

In order to encourage an open discussion it was agreed with the participating authorities that results from the survey would be anonymised.

2 – Common Themes

As already outlined in the introduction, it was reassuring to note and vitally important to reiterate here that in all schools visited the positive feedback received from users greatly outweighed any issues raised. The general feedback was one of delight with and pride in their new schools. Feedback in respect of classrooms and other teaching areas was largely positive and most of the issues raised related to the common areas or general environment. Summarised below are several common themes highlighted by users in nearly all of the schools visited. Detailed information on points to consider is included in later chapters. It should also be noted that the common themes identified overlap in many areas with issues raised in the CABE[2] review of secondary schools in England and thus are not unique to Scotland.

Circulation Space

This aspect was commented on in every school visited. Some had corridor widths of 1.8m and ceilings heights of 2.4m while at the other end of the spectrum some had wide corridors of 3.2m and heights of 3m, others were 2.5m widening out to 5m to give flexible teaching spaces. Students in a number of schools made comments about "pinch points" along what was otherwise perceived to be good circulation space. In schools with generous circulation space, both students and teachers commented on an improvement in behaviour.

Further information can be found in chapter 3.

Ventilation and Overheating

Overheating and lack of fresh air, particularly in south facing classrooms, was the main issue identified. Generally, ventilation was provided naturally via opening windows but it was often found that there was insufficient awareness that in some cases for the ventilation system to work correctly, both the bottom and top windows had to be opened rather than only the bottom. Where staff were aware of how the system should work, they often commented that top windows are not used as they are too difficult to operate (often via a pole which can be hard to manipulate). In some schools, the upper window is opened by a remote winder which appeared to be a better arrangement from the feedback received. Rooms that are subject to direct sunlight require blinds to be closed so that whiteboards can be seen, the effect being restricted airflow resulting in less than optimum ventilation and potentially causing considerable nuisance with flapping blinds (generally hanging vertical blinds had been provided which appear to break easily under these conditions).

Further information can be found in chapter 4.

[2] http://www.cabe.org.uk/files/assessing-secondary-school-design-quality.pdf

Student Social Space

Senior students were very vocal on the issue of social space. Where they considered that inadequate senior social space was provided, students felt that they were not being treated as young adults who were staying on at school by choice. At the other end of the spectrum, junior students in some of the larger schools often felt intimidated by the very large communal spaces used for all students at break and lunchtimes. Younger students liked schools which had various smaller areas, although staff were not as keen on these from a supervision perspective.

Further information can be found in chapter 5.

Catering and Dining

Schools employ different strategies to feeding a large number of students within a restricted time period at lunchtime. Queuing was the main concern raised by students. In some schools queuing was less of an issue where separate serveries were used and was this liked by students. Some remote serveries had both hot and cold items, in others sandwiches were provided and some were reserved for senior students only. Where schools used the "street" concept with no separate assembly hall, there was more space for dining but this did not ease queuing if the servery could not cope with peak demand.

Further information can be found in chapter 6.

Practical Subject Classrooms

Home Economics and Craft Design and Technology (CDT) classrooms were another area which received much comment. It is evident that these spaces need to be carefully considered, particularly in relation to how the rooms are configured to allow students to do practical work comfortably at cookers and craft benches and at other times carry out written work while facing the teacher and whiteboard.

Further information can be found in chapter 15 and 16.

Procurement Documentation

In respect of procurement documentation a general observation was made that in a number of Client briefs it had been stated that when the Authority Requirements (ARs) are unclear, or where any misinterpretation arises, the Room Data Sheets (RDS) take precedence, as the means by which a Client assesses whether their requirements have been met. Whilst this is a common approach, it is one that should be duly considered where the RDS do not seem prescriptive enough to achieve the ethos and vision set out within the AR. If the two documents are not clear in terms of the overall

requirements, opportunities can be lost, and this was noticeable in less well defined or more 'flexible' areas such as dining areas.

A number of LAs stated that areas were to be developed in terms of their overall layout in liaison with the project team, to ensure that the final design meets the Client's initial vision. If the specific areas, fixtures and fittings, and environmental requirements are clear and well detailed within the RDS, this can be an effective way of ensuring that the AR are more closely met. The added advantage is that the Client should sign off the final design in its entirety.

3 - Circulation

The schools visited displayed a wide variety of circulation provision, which according to the feedback received worked with varying degrees of success. Many schools were light, bright and stimulating whereas others exhibited circulation spaces that often impacted negatively on good student movement resulting from design, or simply an inadequate brief. In all the schools visited, the circulation spaces provided prompted differing comments from teaching staff, students and FM staff alike.

When reviewing the corresponding Authority Requirements (ARs) it was noted that there were variations in the way circulation spaces were detailed. These variations were particularly surprising given that the eventual outcome should have been to achieve a clear, efficient and suitable circulation strategy for a secondary school. Whether some LAs were better informed or more aware of design pitfalls, or simply that some placed more importance on this than others is not clear.

Scottish Building Standards set minimum requirements for circulation routes, both horizontal and vertical, to ensure statutory compliance. Compliance with these standards simply ensures that all occupants of the building can escape safely in the event of a fire within an accepted timescale. During an emergency evacuation or fire drill, all students are generally under the control of a staff member, none of them are carrying schoolbags, and the majority will be moving in one direction towards the nearest external escape doors. This does not reflect general movement round the school at other times, where students will be moving in opposite directions, will be carrying schoolbags, and are generally not under constant staff supervision. Compliance with statutory Building Standards does not in itself ensure that circulation spaces in a particular school will work on a day-to-day basis and based on user feedback specifying this minimum compliance is likely to be inappropriate for the user's needs.

Feedback clearly demonstrates that the dimension of corridors, both in terms of width and height, has a great effect on their success. Not only did the wider corridors provide more student friendly circulation and reduce pinch points at key areas within each school, it was reported in many schools who exhibited 'good' circulation, that student behaviour was greatly improved. Tension amongst students moving along corridors which are inappropriately sized can lead to behaviour issues which is harder to manage as staff were often unable to get to the heart of the problem should any intervention be required. The ability of students to move through the school without being crushed was stated as vitally important particularly by younger and smaller students, and also those with physical disabilities. Schools were often criticised in the past for long narrow corridors, and to some extent this problem still exists, albeit to a lesser degree.

It was reported that the width of corridors can also affect their use for display purposes. Items pinned on corridor pin-boards are easily damaged by heavy student traffic, or by schoolbags, should

they not be wide enough to allow groups of students to pass easily in two directions. The wall finish in narrow corridors was more easily and regularly damaged.
In general the design brief for circulation had been specified in one of three ways:

- The basic minimum acceptable by Building Standards, where there was no specific additional guidance in either the ARs or the Room Data Sheets (RDS). In these cases circulation provision was simply left to the discretion of the provider. Based on user feedback this approach had in general produced the least successful outcomes.
- Circulation was defined within the ARs text, in a form of words describing the Clients aspiration, but gave no indication as to a minimum standard that was to be achieved.
- By far the most positive feedback was received in respect of solutions where a minimum width and height of corridor was stipulated within the RDS, and accompanying descriptive text written into both the RDS and the ARs.

It is difficult for the Client to envisage all possible solutions during the design process and this can make some Clients feel that they somehow have no control over the eventual outcome and form of the building. Most Clients however, if questioned at the initial stages of the design process, would be able to tell what they didn't wish to see in their new schools, yet in many cases nothing was stipulated within the brief to ensure that getting just that is avoided, and the minimum simply applied. If not enough emphasis is placed on the importance of circulation design, and minimum criteria established within the brief, it would appear that this is one of the first areas that is targeted if there is pressure to reduce the overall area.

Best results had been achieved where designers were required to demonstrate within their proposals that thought has been given to the areas in each school where pinch points are likely to occur. Clients should require that internal layouts are analysed during sketch design, and also as the design progresses, to determine areas where internal 'desire lines' could cause congestion, especially at certain times of day when students will all wish to gravitate to the same areas such as dining and social spaces. Based on feedback received, it is crucial that this requirement is written into each brief, and that the movement of students around the building is given as much consideration as the layout and adjacency of departments and individual rooms.

Both good and bad circulation design were observed during the visits. Some schools had corridors so narrow that students filled the entire space between classes, and often had no room to stop, turn around or change direction as they were caught in the flow of traffic from one space to another. Schools that had corridors with low ceiling heights reported issues with vandalism, where students could easily reach the ceiling tiles, and many narrow corridors visibly demonstrated that damage to the corridor walls increased greatly, again often through no fault of the students.

In a great number of schools it was observed that the design of the circulation spaces had been carefully thought out to allow effective management of student flow, and provided a variety of areas designed to mitigate the effects of congestion. Some schools had top lit corridors or voids between

floors to help enliven the environment of the circulation areas and these were reported to work successfully. Staff also reported that any initial concerns regarding student behaviour and misuse of double height spaces, for example concerns that students would throw items over balconies into the areas below, seemed to have been unfounded in most schools. In several schools pedestrian 'bridges' had been designed to take students across the main circulation street from one block to another. Some of these bridges had been detailed with solid balustrades punctured at intervals by glazed panels to allow views to the areas below, whilst some had detailed balustrades to provide good supervision sight lines. This helped to control students' behaviour whilst still producing a visually stimulating and interesting approach to circulation.

The use of colour, or lack of it, was viewed critically by users. The use of white paint throughout corridor areas, with very minimal accents, resulted in students often commenting on the lack of colour, and in the main all wished that their schools were a bit more colourful particularly in the main circulation areas. The use of white for corridor walls was also seen to be difficult to maintain by FM staff, especially where walls were narrow and given a plaster or plasterboard finish, scuff marks caused by schoolbags were commonly observed. Maintenance of circulation areas that experience heavy traffic must be well thought out, and finishes specified to minimise maintenance wherever possible through the use of robust, maintenance free and visually stimulating materials. A great number of schools had painted common block to corridors that although providing the robust finish required, failed to inject colour into the buildings when simply painted white. It was noted that the use of fairfaced block work or brickwork can produce a colourful and robust circulation finish.

The survey highlighted that the importance of circulation spaces to the life of a school, the effect on student behaviour and general wellbeing, and the specific requirement to realise the Client's vision should be clearly detailed if successful outcomes are to be achieved.

Based on feedback, stipulating a minimum height and width for main circulation corridors has been a very successful way of achieving efficient, safe and inspiring spaces. Naturally there may be areas within a school which do not require this minimum, such as staff and admin facilities, however this can be stated as a limited exception to the rule which can be discussed and agreed as the project's design progresses. The width and height of corridors should be appropriate to the space specific volume of traffic. In one particular school the width of the general circulation space varied along the entire length of the corridor, being widest where the greatest student flow occurred, and narrowest where minimum safe access was required for fire escape. The possibility of solutions such as these should be encouraged and given real consideration early on in the project.

Circulation spaces must be briefed as clearly as individual rooms if designers are to obtain a detailed understanding of their Client's vision. Generally much of the circulation will be of a fairly standard design, however, should there be areas which require particular features, such as feature lighting, colour schemes, specific floor finishes, display areas etc, it is recommended based on feedback received that these should be detailed as clear requirements to be delivered.

Clients must be aware that this element of the design is sometimes the hardest to tie down, and seen as more expendable non-educational area when compromises have to be reached. The survey found that the more detail there is within a brief, and specifically within RDS, which must be detailed for each different 'type' of circulation space capturing the Client's vision, the better the chance of the vision has of being realised resulting in higher user satisfaction.

Points to consider –

1. **Client and designers must be made aware of the importance of good circulation design within a school in addition to the more 'education focused' spaces;**

2. **Minimum criteria should be set for width and height of corridors and these should be appropriate to the anticipated student traffic;**

3. **Designers should be required to consider student flow around the school, and to clearly demonstrate their strategies to the Client at the earliest possible stage in the design process, and certainly before the design is signed off;**

4. **The Client's requirements must be clearly written into the documentation, in such a way that it can be used to evaluate different proposals. The more information that can be contained within the RDS the greater the likelihood of success;**

5. **Clear and concise RDS must be written for each different 'type' of circulation space. The Client should satisfy itself that these are capable of delivering desired outcomes;**

6. **Finishes must be carefully considered to provide for low maintenance, robust as well as colourful circulation spaces;**

7. **The use of signage, display and artwork should be clearly stipulated within the brief to help enliven and enhance circulation areas, with clear reference as to where these are to be provided; and**

8. **The appropriateness of using circulation space as social space should be considered (see sections 5 and 6).**

4 - Internal Environment

Any discussion on internal environment must naturally cover ventilation, heating, natural and artificial daylight, acoustics, and low carbon design, as these were the main areas where feedback was most commonly received. Whilst this document is intended to record this feedback and identify areas for improvement, further work will be required by specialist advisors as part of the pilot project to establish a clear strategy which can be realistically implemented and achieved in new school buildings taking account of best practice and relevant guidance including '*Guidance for local authorities on internal environmental conditions in schools'*[3] published in 2007.

Ventilation

All of the schools visited relied on natural ventilation in the majority of areas, supplemented by mechanical ventilation to certain rooms identified within the brief. Generally these were listed as rooms where the depth of the room exceeded 7 metres, where specialist equipment or a large number of PCs were required, or with additional ventilation required to internal rooms. Most of the briefs for recent schools stipulated that natural ventilation was to be used wherever possible. The brief for environmental elements tended to be based on an output specification stipulating the levels to be achieved although some LAs had added specific constraints to the design and gave more detailed information on the types of systems they wish to see.

The majority of schools using natural ventilation reported occasional difficulties with overheating in certain rooms, and students in particular indicated that some rooms suffered from lack of air change and were often too hot. One reason identified for this was that windows were not being opened often enough to adequately ventilate the room, resulting in a build up of carbon dioxide and a stuffy atmosphere. Naturally ventilated rooms work well in theory however there clearly are many reasons why they do not work in practice, at least not all of the time. The main barriers to an effective natural ventilation strategy as identified by users are listed below:

- The system relies on user intervention to work adequately. Staff are required to open the windows for suitable ventilation levels to be achieved, and both top and bottom sections must be opened to allow adequate flow of air to the rear of the room. Some staff members are not aware of this as a solution to their overheating or ventilation problems.
- Some window sections which are meant to open may prove difficult to reach. In many cases manual winders are fitted to assist the opening of high level sections, or poles provided.
- Lower sections of windows are often difficult to reach, particularly where rooms require significant lengths of perimeter benching situated directly below windows.

[3] http://www.scotland.gov.uk/Publications/2007/02/28144045/0

- The requirement for blinds to eliminate glare or to provide dim-out conditions for interactive whiteboard or projector use may inhibit the opening of windows as the blinds (usually specified as vertical blinds as opposed to roller style) can flap when windows are open. It was noted that windows were closed in many rooms when the blinds were drawn.
- Windows require a minimum opening section or area to function correctly. The use of restrictors which limit the openings for safety or security reasons means that more sections have to be opened to achieve the levels required by the ventilation strategy.
- In a minority of schools, proximity of classrooms to busy roads, sports pitches, or other sources of noise deterred staff from opening the windows often enough in order to avoid acoustic disturbance during classes.
- Trickle ventilation in most cases is inadequate for the provision of suitable ventilation levels should the windows be closed on cold or windy days.
- Controlling the environment in each room individually is preferred by users but often not a responsibility delegated to teachers but rather controlled by FM staff and the Building Management System.

Whilst not an exhaustive list, these issues demonstrate the difficulties in adequately managing a natural ventilation strategy to ensure that suitable levels of fresh air are provided.

Most general teaching classrooms surveyed were limited to a maximum depth of 7.5m to ensure that fresh air flow can adequately reach the rear portion of the room. It is important however to remember that if using this as the basic rule of thumb which determines this room depth, the ceiling height also has a bearing on this commonly quoted figure. The survey noted that it is common among designers to consider that the maximum depth of a classroom should generally be no more than 2.5 times the height of the ceiling, so this figure of 7.5m is based on a ceiling height of 3 metres. LAs who stipulated a lower minimum height of 2.7m may not have been aware that this reduced the effective ventilation flow to the rear of a 7.5m room, when the actual maximum depth in this case should have been 6.75m. This highlights the need for advisors and their Clients to be aware of potential conflict within the specification and the limitations their brief can place on any proposed design.

Many schools reported difficulties in ventilating larger spaces such as assembly halls and sports halls. This was particularly an issue when assembly halls were full to capacity, or where large double height spaces encountered problems with solar gain through large areas of curtain walling. Students' feedback was that these rooms were often hot and stuffy, which could cause potential challenges during exams or sports. The level of air change in larger spaces is an important factor.

A key change could be to move away from over-reliance on natural ventilation towards a mixture of natural and mechanical ventilation however when SFT visited schools outside Scotland that used a mixed system it was clear from user feedback that some issues remain to be resolved. Mechanical ventilation has advantages in that it can regulate the flow of air to each individual space, and thus

achieve the air change targets required without having to open windows to an external wall. In addition, this forced fresh air flow can be locally heated to provide thermal comfort, reducing the need for traditional heating systems in the form of radiators or radiant panels. It is important for Clients to clearly establish the criteria they require to be met, in practical terms and not simply in the form of an output specification, and to properly understand the conflicts and compromises which occur when considering the merits of one system against another. The issue of ventilation cannot be looked at in isolation, but must be approached in a wider context with reference to heating, usability, carbon emissions, whole life costs and annual energy targets.

Heating

Most of the schools visited used either wall mounted radiators or ceiling mounted radiant panels as their main source of heating. Radiators are generally used more extensively with radiant panels often only considered for rooms which have perimeter benching restricting the available wall space. Most LAs had relied upon an output specification to inform designers as to the minimum and maximum heating levels required, as there are a number of different design solutions which can achieve these targets. Temperature levels were normally controlled by the Building Management System and individuals often had no localised control over the temperatures in their room. This was most often the case in classrooms; precisely the rooms where users reported the majority of overheating problems. Localised temperature controls were often omitted for fear that students will damage or misuse them. Few of those interviewed reported instances where rooms were too cold but overheating was the most common issue.

Maintaining an appropriate temperature in classrooms accommodating over 30 people can be very difficult, particularly where they rely on natural ventilation, and on the regular opening of windows. Despite careful placing of radiators to external walls to heat incoming air, and mitigate the effects of draughts, there seems no doubt that windows are not opened regularly enough throughout the year to provide either a constant comfortable temperature or sufficient fresh air levels. Many rooms which feel hot and stuffy can be the result of conflicts between these two requirements.

The main findings or practical issues with current heating systems, which directly affect the school's users, are listed below:

- Temperature levels difficult to maintain – rooms often too hot but seldom too cold.
- Limitations on direct control on temperature levels by staff or individuals.
- Wall mounted radiators can be difficult to site in some specialist areas due to FFE requirements.
- Wall mounted radiators often have significant lengths of exposed pipe work which not only provides dust traps which are difficult to clean, but can be easily damaged by students if not boxed in.
- Radiant panels are an option in practical rooms however their ability to maintain a constant temperature throughout the room was not universally accepted.

The use of biomass boilers was noted in a few secondary schools as the main source of heating. Seen as a sustainable method of heat production, primarily due to the green credentials of the fuel source and reduced reliance on fossil fuels. In principle these boilers should provide comparable levels of heat when compared against electricity, oil or gas however there are key considerations which must be carefully analysed against other sources of fuel early on in any project. Some of these are:

- Additional area required for biomass boiler systems.
- Additional storage required for biomass fuels.
- Long term availability of consistent biomass fuel in the surrounding area.
- Reliability of fuel source especially in rural or remote areas.
- Economic costs of both running and fuelling the system.
- The need for a secondary or back up heating system which can greatly increase upfront costs.

Modelling the building at early stages to look at the affects of summertime overheat, will help considerably, together with avoiding large glass facades to the west and south.

Lighting

The topic of lighting covers two key areas, daylight from natural sources and artificial lighting. In addition the related issues of glare and solar gain have an important effect on the function of any room and the overall wellbeing of its occupants, together with wider concerns about overall energy consumption.

In most of the schools visited good levels of natural daylight were observed in the majority of classrooms. Most rooms had glazing to almost the full extent of the external wall, which allowed high levels of light to enter classrooms. In ideal circumstances, where glare or solar gain was not an issue, this provided adequate lighting levels for the majority of the school day, without the need to switch on artificial lighting. Where levels of daylight were good, it was observed that lights were simply switched on as a natural reaction or force of habit. The majority of schools, if not all, had movement detectors which switched off lighting when the classrooms were empty. Some schools had systems which allowed the row of lights towards the back of the room to be switched on separately, which helps in deeper rooms or on dull days. Systems which measure lux levels within a room and only use artificial light when these reach a minimum agreed level, whilst potentially being most energy efficient, were not generally observed perhaps due to higher initial installation costs and the fact that they offer little user flexibility based on individual preference.

In several schools, high level windows were provided along corridor walls to allow borrowed light from adjacent spaces to supplement light levels to the rear of rooms. This was observed to be a

highly effective solution, particularly where these windows look onto top lit corridors or large bright street spaces, but many Clients were nervous about the subsequent acoustic issues which this is perceived to create. When a classroom is occupied, the majority of other students are also in classes, so noise transfer is only really an issue during period changes when students are moving along corridors. It is accepted that adjacent noisy activities can cause acoustic issues, however this is not often the case throughout an entire school. Cost pressures may also have limited the use of corridor glazing, as this typically costs more than a standard wall construction.

Many schools had rooflights on the top floors which worked very well, however they were normally used to light common spaces or corridors and not classrooms. It was observed that the use of rooflights can have disadvantages particularly where teachers or students require the use of interactive whiteboards, computers or projection screens. Many schools which had top lit rooms reported issues with glare particularly where blinds were not provided to these rooflights. The issue of glare will be discussed in more detail in the next paragraph however it was observed that innovative design, where the room layout and position of interactive boards are considered in relation to the orientation and position of rooflights, can eliminate these problems if both designer and Client are aware of the limitations. Clerestorey glazing and use of rooflights can be another effective means of increasing the levels of natural light to classrooms and is particularly effective if these allow only north light to penetrate. Unfortunately this is only effective on the top floors of buildings, and as most secondary schools are two or three storeys high, is a somewhat limited solution to the problem.

Many staff reported that their students had some difficulty in seeing the whiteboard when the classroom lights were on. Students require adequate lighting levels not only at desk height to ensure they can write easily, but also to allow them to see the teaching wall. Teachers' feedback suggested that being able to switch off the luminaries directly above the whiteboard whilst still keeping the remaining on would greatly help these two tasks to be undertaken at the same time.

The orientation of any building can have an effect on the quality of daylight which certain rooms can experience, and also contributes greatly to the issue of solar gain to classrooms. Whilst architects can do much to mitigate the effects of solar gain simply by orientating parts of the school in a particular direction, site constraints and the high levels of natural daylight required to most rooms dictate that rooms will still remain where the gains experienced will exceed acceptable levels. Other methods can be adopted to ensure that these gains are further reduced, and these include overhanging roofs, solar shading in the form of brise-soleil, and light shelves which help provide shade whilst bouncing light onto the ceiling. Very few of the schools visited exhibited any of these features described, and a number of east, south or west facing rooms experienced difficulties with solar gain and glare from sunlight. In general the solution adopted was to close the blinds even partially during classes. However, as previously stated, it was reported that this creates difficulties in opening windows to allow for sufficient natural ventilation for the reasons previously described. The result is overheating of classrooms, and users felt that it was not an ideal atmosphere for teaching

where students are sitting for the majority of the time in an artificially lit room with no external aspect. Cost was often cited as a reason for omitting specific shading devices, but this is further compounded by an acceptance that the envisaged strategy of natural ventilation and provision of blinds are enough to solve the main issues. Classrooms that require the blinds drawn for a great proportion of the day easily become overheated and 'stuffy'.

Acoustics

Little general feedback was received on the subject of acoustics and most comments relate to space specific issues which are discussed in the relevant sections of this document, namely 6, 9-13, 16, 17 and 21. Most ARs make reference to Building Bulletin 93 – Acoustic Design and ask their designers to comply.

Low carbon design

Most Clients have included sustainability and energy efficiency as design requirements. In general many schools have relied on technology to provide energy savings however these can have maintenance problems and the energy savings may not therefore be what was envisaged. The more reliable method of achieving low energy use relies on the building fabric and form to provide a reduction in the demand for energy use. In a number of schools insulation over and above the minimum buildings regulations and having air tight buildings has worked successfully to reduce the need for heating in winter to the extent that very little or no heating is needed, saving significantly on boiler capital costs and infrastructure. It is also important to orientate the building so that the entrances are on the leeward side where possible, and do not create draughts going through the building.

Points to consider -

1. **Ventilation, heating and lighting cannot be looked at in isolation and must be approached together with reference to usability, carbon emissions, whole life costs and annual energy targets;**
2. **Individual comfort zones are different and consideration should be given to introducing a degree of local control where appropriate;**
3. **Modelling the building at early stages to look at the affects of summertime overheat should be used to inform design development;**
4. **Using daylight, with reduced glare, to displace artificial lighting will help students to work more effectively and can substantially reduce the amount of energy needed for lighting;**
5. **Windows should be predominantly to the east and north to reduce over heating in summer. Blinds should not obscure part of the window when open, as the amount of daylight coming in is then reduced;**
6. **Entrances should be away from the prevailing wind; and**

7. **Light levels of artificial lighting can be reduced by ensuring that lights also light the ceiling making the area feel bright. Both minimum and maximum light levels in each area should be set within the brief.**

5 - Staff and student spaces

Staff rooms and workspaces

This particular topic generated a lot of feedback, both positive and negative, from staff members during the school visits. In the vast majority of schools departmental staff bases were provided, however these functioned with varying degrees of success depending on the users and management policies. In addition to these bases, staff members in some schools had a common social staffroom, which was generally without work preparation facilities, and in a few instances a further staff cafe or lounge was provided which added value when made available for community lets.

Location of staff bases was generally within each department or faculty, and this seemed to work well particularly where the bases were of a generous enough size and offered good facilities. It was observed that the larger centralised staff rooms, whilst seen as desirable, were generally underused in many schools particularly where additional departmental bases were provided. Many Head Teachers felt that an additional combined staffroom was important as it offered opportunities for staff from different departments to meet, and increased the sense of unity amongst staff members as a whole. It was accepted in the larger schools that no room could be designed to accommodate all staff at any one time and in general whole staff meetings or presentations were held in the Assembly Hall or a larger seminar room. One school in particular had a generous conference room which could accommodate large numbers of staff at any one time, and also offered a flexible space for other functions such as parent meetings, presentations or community gatherings.

The most successful staff bases according to interviews were those which provided areas for the preparation of class material and included good IT facilities, social space in the form of comfortable seating and low level tables, coffee and tea making facilities in the form of a small kitchen, security for the storage of teachers' personal belongings, and good display areas. In most cases separate staff toilets were located adjacent to the staff bases. Where all these functions were provided, looking at the accommodation schedules a rough rule of thumb seemed to be that 5m² was required per staff member. Some smaller departments shared a base, and this worked well in most schools if the space provided was felt to be adequate. Schools reported that the advantage in providing workbases where staff actually wish to spend time was that less reliance is placed on the use of a classroom area for preparation by staff, freeing up the classroom to be used by another teacher, and increasing the occupancy efficiency of school overall.

Based on feedback, the least liked areas were those which did not have natural daylight, had limited facilities for preparation and access to IT, or were simply too small to accommodate the number of staff in a particular department. PE staff seemed to suffer particularly in this respect, as location adjacent to sports facilities often resulted in internal rooms with no natural daylight or ventilation.

Points to consider –

1. **Functional requirements of staff work bases to be assessed;**
2. **Adequate size of bases to accommodate both the number of staff and desired function; and**
3. **Consider whether a centralised common staff room best meet the needs of users.**

Student Social Areas

Students in most schools were very vocal regarding the provision of social areas, particularly where these had not been provided, or where too many restrictions made them, in their eyes, unattractive to use. Feedback from students suggests that only a few had achieved what were deemed good social spaces, and these were often only provided for senior or 6th year students.

In some instances where social spaces were briefed in area terms and where it was noted that 'social spaces can be off main circulation', it appeared that such social space was often swallowed up in the circulation area measurement or added to the dining space, increasing this area to alleviate concerns regarding its ability to cope with large numbers of students at lunchtimes. In other instances, areas were provided, but were no more than a name on plan, and formed part of one large space without any clear separation or individual identity. It is evident that these spaces are one of the first areas to be compromised where the main focus is on the 'education spaces'.

Issues of security, supervision, noise, vandalism and bullying are often held up as reasons for non-provision of space, or space which students do not want to use.

In some schools social spaces were provided as small areas off corridors, where there was limited room for seating or display, no IT facilities which would permit internet use or study, and limited opportunity for interaction between year groups. For these reasons some social spaces were often underused by students.

Most briefs cater for specific year groups and not for individual student's social needs. As an alternative, and taking into account concerns regarding supervision and behavioural issues, it may be more appropriate to brief for different types of space rather than assuming that all 5th year students wish to socialise together in one large undesirable area.

Not all students will wish to use these spaces simultaneously and the biggest pressure on these spaces will naturally be at break times and lunchtimes. During both of these times a certain proportion of students could be using playgrounds or external social spaces (if these are designed attractively and briefed to include proper sheltered areas) and at lunchtime some would be eating, some may be using sports facilities, some may be using the library and so on.

Observations suggest that briefing for two distinct age ranges is probably the best solution, dividing the school into lower (1st to 4th Year) and upper (5th and 6th year), and assuming that the requirement or desire for social area is probably greater in the upper school. Using a 50:50 split in area would offer senior students proportionately more space than their junior counterparts. The feedback received seems to suggest the following:

Lower school - Access to IT/comfortable seating/direct access to outdoor space/access to toilets and lockers/ some quiet space/display areas

Upper school - Access to IT/comfortable seating/direct access to outdoor space/access to toilets and lockers/some quiet 'chill-out' space/display areas/study space/access to snacks etc/a sense of ownership

It was noted during a number of visits that with proper briefing and innovative design social spaces can be more than a sterile area simply noted as social space on a plan. A certain amount of supervisory control must be exercised over these areas by staff, however this should be achievable without making the students feel that they are being supervised constantly, as this was a concern particularly with senior students.

In general, providing defined zones i.e. areas which are not simply part of a larger open area has been successfully achieved. This is best illustrated by a large classroom with the corridor walls removed. The social area needs to be partially screened off from the surrounding circulation and other accommodation; this can be done through use of low level screens and furniture that would still allow more passive supervision of students by staff etc. The position of the social areas needs to be carefully considered, particularly in respect of senior students, so that social spaces do not disturb teaching.

For the lower school proposals could include a ground floor location with direct access to outside covered play area and beyond, located adjacent to lockers and student toilets (which would be under a separate and additional area allocation), close links to dining area though distinctly separate, wireless IT connection, area for general social seating (this can be robust, plastic or metal type but in bright and stimulating colours) and display space.

For the upper school proposals could include an upper floor location (but could also be ground floor if designs permit – not as crucial perhaps to have direct access to playgrounds for senior students), possible direct access to outside covered terrace space, located adjacent to lockers and student toilets (which would be under a separate and additional area allocation), vending area to provide snacks etc, wireless IT connection, areas of general social seating and tables (this can be robust, plastic or metal type but in bright and stimulating colours), study area with individual 'booths' or separate areas for individual study (these need to be appropriately lit), with suitable desks and chairs for study, and have access to power points and either network points or wireless IT, 'quiet zone' with more comfortable seating, an internet cafe area and display space.

Many schools allowed students to make use of the library for individual study, providing quieter areas where students could go during free periods, during lunchtimes and before and after school. This seemed to work well, particularly as the space could be passively controlled by staff. Most students reported that access to the library during these times was beneficial and allowed them to make good use of all the facilities available.

Where social space is provided, encouraging students to raise funds for additional features throughout the school year had in some cases helped to engender a sense of ownership, and had helped to allay fears that the students will not take care of their own spaces.

Points to consider –

1. **Overall benefits of social space for students who spend more and more time at school, particularly in the mornings and after school hours;**
2. **Stakeholder involvement to establish not only the desired accommodation but also the system of management which will be in place to supervise students. Without this there is the risk that areas provided will be mismanaged or not used as envisaged due to a lack of understanding of the original vision. This can be particularly evident where new management staff were not able to input into the original design;**
3. **Acceptance that social space can have a great effect on student satisfaction, behaviour, overall wellbeing and education;**
4. **Many senior students wish to be treated as adults, and allowed to take some ownership of their spaces;**
5. **Location of social spaces to ensure that they are not simply swallowed up within other accommodation (see sections 3 and 6);**
6. **Flexibility of area to ensure that students can use their social areas throughout the day without disturbing teaching spaces;**
7. **Greater passive supervision to allay fears that social spaces will become unmanageable;**
8. **Provision of social areas which students will actually wish to use and that meet the needs of students; and**
9. **Access to toilets and lockers adjacent, as well as opportunities to spill out into external student areas.**

6 - Dining Areas

Most schools aspired to provide their secondary students with two key features. Firstly, a healthy and varied menu that reflects the students' eating habits, and secondly spaces within which to eat which cater for the students' individual social and dining patterns. If both of these are successfully achieved, most schools reported an increased uptake in school dining resulting in limited numbers of students tempted to eat off site. Whilst the provision of a suitable catering kitchen, able to provide the variety of meals required, is fairly easy to brief, it was evident that the design of the dining spaces themselves requires careful consideration if students are to be encouraged to stay within the school grounds during their school lunch hour.

Generally the layouts within each school offered a good mix of seating areas and types of seating for students to reflect a variety of dining styles. Different sizes of tables with either integrated or loose seating were provided in most schools, with some offering various forms of sit up and cafe style seating as alternatives. In many schools the dining area was within a clearly defined area, specifically screened off and well laid out to ensure that safe circulation routes were maintained, however in a few the layout of loose seating was seen to cause some congestion where general student movement was somewhat problematic during lunchtime.

Some of the schools visited operated a system of staggered sittings for student dining. Generally these were in the region of 15-20 minutes each, and year groups were offered opportunities to be first in line on different days of the week. In general however students were allowed to access the dining area as and when required. Some schools with no clear system in place managed this successfully; however this success was primarily down to an efficient and well-managed queuing area.

Based on feedback the queuing system in operation within each school had a dramatic affect on the management of the dining halls. In some schools a clear area was defined for student queuing, which allowed students to safely stand in line with minimum disruption to other diners. In other cases however, there was no clear or apparent queuing strategy, and students were seen to disrupt adjacent circulation spaces, or nearby diners, through lack of a suitable queuing area.

Most schools operated with one main servery, which served both hot and cold foods. A variety of methods to manage the serving of student meals was operated, however one particularly successful strategy was where the serveries mimicked a fast food style of delivery, where turnaround was quick and efficient. One clear advantage was that most students knew how to use this type of servery. In one particular school, separate smaller serveries were set up to deliver cold foods such as sandwiches, salads etc, which relieved the pressure on the hot food area, although the required added queuing areas must also be taken into consideration. Another strategy was to provide smaller serving kitchens which had sheltered access for students to purchase snacks from the external play areas, further reducing pressure on the dining hall.

Cashless catering was in operation in the majority of schools, and was successful in reducing queuing times. Top up machines for cards were located within the dining area itself, with some schools providing additional areas throughout the school to encourage students not to wait till lunchtimes to ensure they had sufficient funds available. Menu signage varied greatly across all schools. Some had colourful integrated menu display boards above the serveries, again mimicking fast food outlets, whilst some adopted a more low-tech approach, using whiteboards to inform students of the daily choices. Plasma screens were widely used in dining areas however these were not often employed to display menus or daily choices.

The ways in which schools used their dining spaces outwith lunch times varied throughout all schools visited. Those schools which relied on their dining space as student circulation or assembly space throughout the day suffered slightly from the need to clear the majority of tables and chairs during these times. In this respect perceived flexibility was not achieved in many cases. Some schools allowed students to use the dining area as social space or study space during class times, noise was often an issue, especially where the dining areas were located adjacent to admin or teaching spaces.

The general wording within the brief was generally similar across all projects, and it seems that the vision of all Clients was similar in terms of what they wished to deliver. A few key changes in the way these areas are briefed and described appear to make a huge difference to the eventual outcome. For example asking designers to '*maximise numbers of tables and chairs*' can result in an overcrowded and badly laid out dining hall, whereas specific reference to a number or seats to accommodate a certain number of students allowed for a better layout and circulation. Some briefs asked specifically for queuing systems to be designed to minimise student crush, and to allow queuing to take place in dedicated areas distinctly separate from the main circulation. Others simply asked for this to be '*adequate*' and gave no further design parameters or criteria. Inadequate description or specification where the original brief is not clear as to its requirements can lead to misinterpretation.

In many schools the dining and social areas were briefed in conjunction with student social areas, appearing under the heading of 'social/dining'. Given the feedback received from students and staff it seems inappropriate for this to be considered the ideal. Dining, although a social activity, is not the only way in which students wish to socialise, and specific student social spaces were often lost, or worse completely unidentifiable within many large dining halls.

The most positive feedback was received in respect of dining halls which displayed the following key features:

- Distinct queuing areas, separate from all other circulation, and clear of student dining tables.
- Access to outside space, preferably with covered external picnic tables.

- Wide serveries with several queuing points or even several smaller serveries for cold foods.
- Views and aspect to outside spaces.
- Variety in ceiling height – not simply huge double height spaces which can have acoustic issues.
- Good variety of seating types, both fixed and loose.
- Interesting furniture which reflected the Client's aspirations.
- Possibility of seating remaining out throughout the day for student and staff use.

Issues highlighted by feedback:

- Dining halls close to admin and teaching areas resulting in acoustic issues when these were used as social space throughout the day.
- Dining areas should be clearly defined.
- Layouts with too many loose chairs which were difficult to manage.
- No dedicated queuing area resulting in congestion and behaviour/management issues.
- Messy handwritten menus resulting from inadequate provision of facilities for clear display.
- Double height spaces with no external aspect, resulting in poor acoustics and the need to shout even louder to make oneself heard.
- Dull and institutional furniture. Robust but unattractive.

Those designs which had obviously been discussed at some length with the design teams, and where the eventual layout and specification had been part of a separate design exercise, clearly exhibited the best results. Those dining areas which had been designed with a specific management strategy in mind, seemed to be the most successful, as they had been developed according to the needs of the staff and students. Expecting teachers and students to be able to operate efficiently in a space where they have no clear idea as to how it should operate and what the design has been based on, is unlikely to yield consistent outcomes.

With an area such as this, the choice of furniture can make the difference between a good and bad layout. School designers are not normally responsible for the procurement of loose furniture, which may need to be rethought as their envisaged designs can often be dependent in some regard on a certain look or type of furniture. Whilst the loose furniture may be procured by a separate party, the best results are seen where this has been considered an integral and important part of the whole design.

Solutions had been achieved where the dining area had been briefed to reflect its primary purpose, and was not expected to provide social space, received most positive feedback. Student social space, if the feedback from students is taken on board, has distinctly separate criteria. If student dining and social space are located adjacent to one another this can be successful, but expecting them to be interchangeable and developed from the same RDS has proven to be less successful.

It is difficult to compare schools due to the way in which their dining areas are briefed, however allowing 0.33m² per student in three sittings would seem to be an average based on the schools visited. To achieve this it should be noted that circulation space is additional to this specified area, as is any additional requirement for social areas for students. If students have separate social spaces, they are less likely to congregate around the dining hall, taking up space which can be used for other students.

Points to consider –

1. **More robust brief which better and more clearly describes the Client's requirements;**
2. **Briefing of social, dining and social spaces separately;**
3. **Distinct queuing areas which properly help to manage students and reduce congestion of adjacent circulation spaces;**
4. **Use of more than one servery to increase serving times, and reduce length of queues;**
5. **Design of serveries to include menu boards or screens where menus can be displayed;**
6. **The number of sittings should reflect the size of the dining hall, available queuing space and overall provision of social space;**
7. **Provision of external views and access to external covered dining spaces;**
8. **Variation in ceiling heights to provide better acoustics and more variety of space;**
9. **Better choice of both fixed and loose furniture which adequately reflects the vision of the Client and aspirations of the school; and**
10. **Greater Client involvement from the outset to ensure that the requirements of the brief are met.**

7 – Community use

The extent to which schools involved their surrounding communities varied greatly across the schools visited. Shared assets ranged from libraries, indoor and outdoor sports facilities including swimming pools, theatre and assembly spaces and classroom and IT facilities to support adult and life-long learning programmes. In many of the schools visited, excellent use of the school's facilities was being made outwith of the normal teaching day by local sporting clubs, drama groups, and community youth organisations, and the feedback from students seemed to be very positive when they were questioned about returning to school for evening and weekend activities.

The survey highlighted that the successful achievement of out-of-hours use relied on a few important factors. Firstly, and perhaps most crucially, the involvement of the LA leisure department and discussions with key stakeholders as early as possible in the design stage was considered vital. Their input, together with that of the facilities management team who may be partially responsible for access, can have a direct influence on the final design and it's suitability for out-of-hours operation. Projects which involved these parties and allowed them to feedback into the design process often ended up with the best results, as those who would benefit from the out of hours access were fully aware of the how the design worked, and how they would use the building. Secondly, it can clearly be seen that design can heavily influence a building's suitability for out of hours use as in some instances users' feedback indicated that security issues were the main barrier to successful operation of the facilities. Complications arose within schools where access through the main school is required for fire escape by community users, or where shared toilet facilities also require access to areas otherwise used by the school during the day. In many cases electronically controlled doors are used to assist in the management of these spaces to limit or control access.

Some schools where out of hours access worked successfully had been briefed with a distinct requirement for a community entrance providing access to sports and changing facilities. In these cases, clear delineation was maintained between the school and the community facilities, though these doors required additional management by staff to ensure controlled entry by community users. Where schools wished to use the sports facilities and other facilities within the main school (such as assembly hall or theatre), additional management staff were often required to control two separate entrances.

Generally most of the school sites functioned well given the multiple uses that are required by various parties. Some schools, particularly those designed as part of a campus facility, reported that walking distances to sports facilities were long and impacted negatively on class times for PE. Car parking seemed to take up a significant area on most sites; this is unavoidable given the location of some schools and lack of any alternative transport for teachers and staff.

Many schools operated on the basis that the main entrance was only used for staff and visitor access, with students required to use these only if they were late at the start of the day. Students were generally encouraged to access the building via student entrances which were usually sited to

allow entry from playgrounds or external social areas. Some schools reported that students did not use their own entrances, and that student desire had resulted in the main entrance doors being used by everyone throughout the day. Although in a few cases this was a simple management issue, it unfortunately placed additional pressure on these entrance areas which had not been designed for this volume of traffic, and had resulted in compromised security and frequent damage to the entrance doors themselves. Management of both student and main entrances is required by staff and FM, and this worked more successfully in some schools than others. It was noted that those staff who had been involved in the process from the outset had been able to contribute to the eventual design, as they understood both the features and limitations of the design.

Points to consider –

1. **Clear assessment early on in the process of likely community involvement;**
2. **Involvement of key community stakeholders who readily accept that their requirements are important but cannot compromise the ultimate needs of the school;**
3. **Proposed management strategy in place early to allow valuable input into the design;**
4. **Consideration of separate community entrances for sports facilities and control areas/community office to support this function; and**
5. **Discussion as to whether a separate or linked facility for sports could reduce operational difficulties.**

8 – General Classrooms

In all the schools visited the standard of general classrooms was high, and relatively consistent. These rooms are, by their very nature, often similar in layout throughout a school and also across different LAs, however there were some minor variations observed.

The area of general teaching classrooms varied from a minimum of 58m2 in some schools, to a maximum of around 65m2. The area of these rooms directly affects their function, and general adaptability in terms of layout, so it is not surprising that those with smaller classrooms encountered more problems than those where more space was available. A few schools had been provided with acoustic walls between classrooms to offer adaptability and the opportunity to teach larger numbers of students at one time. Generally these were popular where provided, with some schools using these rooms for smaller exam groups, and the qualities of the acoustic partitions, whilst not as good as a solid wall, were acceptable.

The provision of ICT facilities for teaching staff varied to a wide extent across the school estate. In the vast majority of schools interactive whiteboards were provided in each classroom, proving popular with most staff and students and widely used throughout all lessons. Some slightly older schools still functioned with traditional roller boards or simple whiteboards. In schools where interactive boards had not been originally fitted these were generally being retrofitted to an agreed programme. Most classrooms had provision for additional ICT in the form of benching for a small number of PCs.

Whilst the functional requirements of the teaching wall in each classroom were fairly standard, their implementation was more successful in some schools, and particularly where larger classrooms offered greater flexibility. Some schools had inbuilt storage in the teaching wall, where all services were integrated, and from a storage perspective this was a neat response to the teachers' needs. Some staff noted that the students' sightlines of the whiteboard or interactive board were slightly compromised with this arrangement, however if these issues could be properly resolved, this would be a good solution. In rooms where loose storage was provided in the form of tall cabinets, this can result in staff rearranging the room to suit their own particular needs and, whilst adaptability is often a key requirement of these rooms, some staff like this more than others. Smaller rooms suffered from obstructed views of the teaching wall where space constraints had resulted in the teacher's desk being positioned in front of the interactive board or whiteboard. Only a few schools had height adjustable interactive boards as supplying these in all rooms is prohibitively expensive. Teacher's boards of all types must be positioned at such a height that they can be reached by staff and students whilst still being viewed from the rear of the classroom, and solving this problem without the use of adjustable boards is a difficult one.

Good levels of display pinboarding were provided in the majority of rooms, and generally this was clearly stipulated in the AR and RDS. Where whiteboards had been provided on walls to some classrooms at the LAs request, staff were quick to report that these were not well used, and noted that they should not be positioned above perimeter benching where they can't be reached.

Internal finishes were standard throughout, and the use of white or off white paint was noted in most rooms. Students noted that they would have liked more colour in the classrooms, and schools which had injected colour by highlighting the teaching wall did seem a lot brighter and more cheerful. The standard of fixed furniture in classrooms was generally good throughout, with little reported problems.

Points to consider –

1. **Analysis of the minimum acceptable area in terms of functionality;**
2. **Consideration of teaching wall facilities requirements to provide optimum design options; and**
3. **Greater use of colour to provide a more stimulating classroom environment.**

9 – Flexible learning spaces

In the vast majority of schools visited, the standard provision of teaching space for general subjects such as Maths, English, Modern languages etc were briefed as traditional classrooms albeit with modern technology installed. Some schools had additional tutorial spaces, which allowed smaller classes or groups to be taught, but in a fairly rigid format. Only one school had specifically briefed flexible teaching space. This data sheet for this space stipulated that:

'These areas will be used for a variety of purposes which will differ across subjects and across time. Uses will include: Access to ICT and A/V outside of the classroom, study/research space for senior students, project space, display space, small group work, support of individual students by Learning Support staff, communal resource area.'

The specification within the project documentation resulted in flexible teaching areas being spread throughout the school, generally within enhanced-width corridors. Care must be taken within the brief however to ensure that these areas are well enough defined in their function and requirements to ensure that a truly workable space is provided, including the stipulation of a minimum dimension to be achieved. In this one school, given the average provision of classrooms per department and comparing to others of a similar size, it would seem that only one classroom was specified as 'flexible learning space' for this provision to be achieved, and at no apparent detriment to the timetabling of the school.

Some briefs asked for classrooms with retractable partitions to allow adjacent rooms to be combined into one larger teaching space. In some projects although not specified this feature had been introduced during the design process. Where this feature was provided it seemed to work well, and some staff noted that these larger spaces could also be used for examinations, where the numbers of students taking a particular subject was relatively small. In most cases this separating wall was a retractable acoustic partition and student feedback indicated that the noise levels in each classroom were acceptable for general teaching. One slight disadvantage of this option in layout terms is that nothing can be fixed to the separating wall which slightly limits the classroom's layout opportunities. Acoustic partitioning may not meet the same sound insulation standards as a solid wall, however if this is understood, it can be very effective way of adding flexibility to teaching spaces.

Points to consider –

1. **Whether the apparent or perceived *sacrifice* of a teaching space to provide flexible accommodation can be achieved whilst still retaining the required number of classrooms to support the general curriculum;**
2. **Location within the school and whether these should be incorporated within a wide corridor or a separate but open plan area;**

3. **Specification must be detailed enough to reflect true aims and ensure provision of a suitable layout which supports staff and students;**
4. **The use of acoustic partitions to separate classrooms can be effective and add flexibility however limitations in terms of sound insulation and layout must be balanced against cost and overall benefit to the school; and**
5. **The flexibility required in learning spaces must clearly link into current and anticipated changes in teaching and learning.**

10 – Assembly Halls

In the majority of schools visited separate assembly or performance halls had been incorporated, with a few schools exhibiting assembly spaces accommodated within more flexible 'street' areas. Generally the mostly positive feedback was received in respect of designs which provided a separate hall, as those with a space designed to be flexible within a large open space reported difficulties with operation, acoustics and overall flexibility.

Assembly halls were primarily designed to allow an area where large numbers of students and staff can gather, either for regular assemblies, presentations and prize-giving or for school music and drama productions. Secondary functions include use for exams, school dances, fetes and fairs, exhibitions and so on. Many schools consider exam use a primary function, as giving up this space during exam times has less effect on whole curriculum provision than the alternative use of games halls which can disrupt the PE curriculum. Non-provision of a separate hall requires the use of sports halls for exams where no other suitable space is available and this was seen as a distinct disadvantage.

All of the assembly spaces in schools had a stage area which could be used for various functions, primarily presentations and music and drama performances. Stages were either of a fixed type commonly found in small theatres, or were formed from demountable units, and the choice was usually stipulated within the brief. The type of stage specified was dependent on the individual schools preference, with fixed stages requested where the school had a particularly strong music and drama department. Alternative layouts with demountable stages offered greater flexibility to those schools which had fewer requirements for traditional performance facilities, or where flexible stage arrangements allowed for 'theatre in the round' configurations. It could be observed that flexible demountable stages were not often reconfigured, at least not as often as initially expected, which would raise the question in some cases as to their true suitability. These types of stage are not as robust as fixed stages, tend to move about, and cannot really provide a truly suitable finish and surface on which to perform a variety of events. The majority of feedback on the demountable type of stage was negative.

The width of stage was in many cases critical to the proper function of the space. All stages used for school performance require suitably sized wings, and backstage areas to allow for hidden movement backstage. In some cases both students and staff reported that the width of the wings was not enough. Some Clients specify a clear width for the stage in their brief, or certainly the minimum width of room in which this is to be accommodated, which is generally agreed as being the minimum to allow proper function of the stage and surrounding areas, and this seemed in most cases to produce good results. Access to the stage worked well in a number of areas, and less so in others, especially where the stage was required to be 'too flexible'. Clients should be clear as to the functions their spaces require to satisfy, and be able to compromise if required, to avoid designers simply trying to satisfy all the requirements of a Client's brief without questioning their validity.

Several schools use the stage area, sometimes enhanced to include larger back stage facilities, as a drama studio where this was required within the curriculum. Doing so is beneficial as all the stage facilities such as lighting and sound are readily available and better use is made of an area which is otherwise used only intermittently. Where this was the case, the drama area was separated from the stage area either by means of a curtain, or by an acoustic partition. The performance of acoustic partitions needs to be extremely high if the drama space is to be used simultaneously with another event in the adjacent assembly hall. Several schools reported that they could not use the drama studio when another activity was taking place.

Seating was provided in various forms, either a traditional loose arrangement, fixed raked seating, or retractable bleacher seating, or in some cases a combination of raked and loose seating was used. Generally feedback on the different types of seating was minimal.

Acoustics generally within assembly halls received good feedback, with efforts made in some cases to attenuate the space to provide a good acoustic environment. Some schools reported that music performances caused issues in these spaces. Transfer of noise to and from the assembly spaces had certainly been considered, however less attention was paid to the acoustic quality of the spaces from a performance perspective. The spaces and facilities provided were infinitely better than many schools had in the past, however there is still some room for improvement.

Sound and lighting control facilities were provided in all schools, however these ranged from a separate room towards the back of the hall (usually at high level), with intercom connection to the stage, to a localised control panel simply located within the room to one side of the stage. A facility within a separate room was the solution best received by staff and students. The benefits of a separate room outweigh the costs of installation, even if the specification within these rooms is fairly basic. Not only do they allow better views of the stage area for sound and lighting control, but they can also be used for recording performances. In addition separate rooms provide lockable secure storage for expensive items of equipment which otherwise would be vulnerable to damage and could be tampered with.

Specialist lighting provision in most schools was good, and increased opportunities for different types of performance to take place. Access to these lighting rigs was problematic however as many were fixed in position and had to be accessed by temporary platforms when lights had to be adjusted or moved. In one school the lighting rig was on a flexible pulley that could be lowered to allow access to the lights, and the only other suggestion received from staff was that all the lights could be remotely controlled if the rig is not adjustable. Cost is again a reason cited for fixed frames to be provided in lieu of adjustable types.

In addition to indoor assembly halls, many authorities had briefed the requirement for external performance or gathering space. These were occasionally used for teaching, however their location should be carefully considered to ensure they do not disturb those in adjacent classrooms.

In all schools there is a requirement for large spaces to be available for exam use, both for prelims and national exams. The need for a secure, quiet and comfortable area means that most schools make good use of either the assembly hall or sports hall for this purpose. The numbers of students taking these exams cannot be underestimated; in a 1500 student school there could be up to 300 students sitting one exam on a particular day. The use of the sports hall in some schools is therefore unavoidable if the assembly hall is simply not large enough to accommodate this number of students and provide adequate space between desks. Ideally both the assembly hall and sports hall should be suitable for exam purposes to offer schools some flexibility and to limit the effect that exams have on other aspects of the curriculum. This presents a challenge to designers as ventilation and heating levels, together with occupant capacities can have a bearing on the layout and overall design if these rooms are to be used for exams. It is crucial that the school strategy for exam periods is fully considered to ensure that the spaces used are suitable and provide an environment conducive to good cognitive function in terms of their internal environment. The sheer amount of space required to store exam tables and chairs must also be realistically appraised as these can take up considerable area especially in the largest secondary schools.

Points to consider –

1. **Provision of a separate hall to provide suitable facilities for all the functions required;**
2. **Clear functions of the space must be clearly identified to establish any conflicts early on with compromises made only where these do not affect the primary critical functions;**
3. **Use of the hall for exam purposes and the effect on curriculum;**
4. **Whether provision of a fixed stage of suitable width is more effective than a demountable stage;**
5. **Use of stage/backstage for drama classes and whether exam disruption can be minimised;**
6. **Seating type and how this affects the function of the performance space;**
7. **Acoustics need to be suitable for performances. These should be more stringently measured to ensure compliance;**
8. **Potential for inclusion of a separate sound/lighting control room; and**
9. **Lighting provision and how this is accessed by users.**

11 – Sports halls and fitness suites

The quality of indoor sports facilities throughout all the schools visited was reported to be very high. The majority of schools had several halls ranging from large four court games halls to smaller gymnasia, which were also used for dance in a number of schools. The layouts of the halls themselves seemed to be well received with provision made for a wide range of games and activities to take place. These varied from school to school, but in the most part covered all the standard games and sports that would be taught within the curriculum. Individual schools naturally had specific local requirements which had been accommodated and these ranged from swimming pools to climbing walls.

Issues were raised regarding storage within sports halls. **sport**scotland recommends a percentage of the hall floor area to be dedicated for storage of various items of equipment, and this is specified separately for the different types of hall used. In schools which reported a lack of storage space, this could be attributed in part to these guidance standards not being achieved as not all Clients briefing documents made specific reference to the **sport**scotland guidelines, or asked designers to achieve the recommended minimum. In order to design adequate and suitable storage for sports equipment, Clients must be clear as to the types of equipment they are likely to use.

Where a good size area for storage was provided, in some cases this could be further enhanced if the internal fit out of the stores providing more shelving, racking etc to maximise storage within the available area. Designers need to be given a clear brief as to the equipment required in order to adequately specify and locate these items at the design stage. Suitably high doors must also be provided for the easy storage of trampolines that are a common feature in most schools.

Access to these stores was generally via large opening doors. These need to be flush with the surrounding walls, should open outwards into the hall and have no projecting ironmongery. One school had roller shutters fitted to these storage areas.

Wall finishes in most sports halls were generally painted blockwork or painted plasterboard. The requirement to have walls as flush as possible with no projections, especially where a steel frame is used and needs to be covered with MDF or timber plates can result in a somewhat untidy finish. By far the most attractive finishes were those where all of the structure was contained behind the main wall finish.

Acoustics in the sports halls were generally acceptable, and many staff reported no difficulties in teaching two classes in games halls at any one time. In several schools the high level wall finish was in the form of an acoustic board that did help to attenuate or improve the general acoustics, and visibly improve the overall finish. Many games halls were used for exam purposes and acoustics were not an issue during this quieter period, however the suitability of the games halls for use in other school events such as dances could be improved if the acoustics in these spaces were slightly better. The provision of acoustic panelling at high level also helped to cover up structural steelwork

and other elements, which can be unsightly dust traps that are difficult to maintain in the longer term.

The majority of games halls had very little in the way of natural daylight. Where this was provided it was generally at high level, and was certainly not the main source of lighting in any of the schools visited. Concerns regarding the use of glass at low level are usually raised for a number of reasons. Firstly, there is the issue of glare, and the ability to see balls and especially shuttlecocks against the sky. Secondly, issues regarding the safety of students are often raised. The use of specially toughened glass at low level could remove these concerns. Thirdly, some Clients raise concerns over the ability of others to view what is taking place within Sports Halls.

In almost all schools there was no provision for spectator seating. Some schools had openings or glazed windows at high level to allow for views into the sports halls; these were problematic during exam periods as students could cause disruption.

Student changing areas provided a mix of spaces which allowed for both school and community use. In most schools, the WCs were separated but adjacent to the changing areas, primarily to allow changing rooms to be used as unisex facilities particularly during evenings and weekends. Showers were provided throughout, but were very underutilised by students who complained that they were not given sufficient time to use them during PE lessons. Where lockers were provided, these were normally only for extracurricular or community use, and some vandalism issues had arisen. Locating these lockers within the corridor, or certainly outside of the main changing areas, not only reduces the likelihood of student vandalism, but also increases the flexibility of changing spaces in general.

Many staff and students reported that sports spaces were too hot and 'stuffy'. This problem was also reported by FM staff, which suggests that the ventilation strategy for large games halls needs further consideration.

The multi-purpose use of these spaces requires an approach that allows for a certain level of flexibility however the creation of a comfortable and healthy environment for indoor sports and exams will be the minimum requirement.

Points to consider –

1. **sportscotland recommendations, where applicable, should be written into the RDS;**
2. **Types of equipment to be stored must be better detailed at the design stage;**
3. **Internal fit out of sports stores must be better to increase efficiency;**
4. **Carefully consider specification of wall finish to ensure a smooth surface throughout;**

5. **Consider acoustic panels at high level to help improve reverberation times and improve overall flexibility of space;**

6. **Increased use of natural light;**

7. **Suitability of viewing windows into games hall during exam periods; and**

8. **Positioning of community lockers outside of changing areas.**

Fitness Suites

Most of the larger schools visited had a Fitness Suite in addition to the standard sports provision. These proved extremely popular with students especially where access was allowed during the school day for their own leisure use. Many Authorities also made these spaces available for community use outwith of school hours and, where this was the case, they seemed to be popular and well used.

Generally the area and proportions of these rooms were reasonable, however in several cases there could be more room for the use of free weights and warm up/stretching areas due to the high number of fitness machines installed. The rooms were generally not used for teaching, and in many briefing documents this space is anticipated to have a finish and layout similar to that of a commercial leisure facility. The introduction of television screens can help to provide this, however these were not evident in the majority of schools. Colour schemes were often seen as a bit bland, especially where rooms were filled with many large grey machines, and some injection of colour may well be desirable.

Rooms that offered natural daylight and opportunities for external views were most successful, whilst rooms which had no windows or aspect felt slightly claustrophobic. Drinking water was provided in many rooms however this was often not plumbed in or located well which can make the room look messy. One school was considering changing the floor finish from carpet, which was originally specified, to a vinyl finish due to problems with keeping the floors clean.

Some students reported that the rooms were too hot, and issues of heating and ventilation again need to be looked at to specify the most appropriate forms for these areas, particularly where walls need to be kept free of obstructions from a safety perspective. In at least one school the Fitness Suite was located on an upper level, and took advantage of additional ceiling height under a pitched roof giving the whole room a more relaxed feel.

Given the popularity of these facilities with both the community and students, and the frequency with which they are used, a few minor adjustments, together with a proper and more realistic assessment of function, may make them operate as envisaged.

Points to consider –

1. **Overall dimension and area to provide the possibility of use for teaching;**
2. **A more realistic assessment of the number of machines installed to ensure there is greater flexibility and areas for warm up etc;**
3. **Final finishes need to be more considered if the desire for a modern leisure facility is to be achieved and be more attractive to both students and community users;**
4. **Heating and ventilation strategies must be assessed to minimise overheating and provide a healthy environment in which to exercise;**
5. **General location should be considered to permit a more 'open' and accessible feel;**
6. **Drinking water facilities must be designed in to avoid looking like an afterthought in many cases;**
7. **How perceived security issues can be overcome to allow greater student access; and**
8. **Specific storage for the Fitness Suite – is this required?**

12 – Art Department

Art Departments were generally reported to work well and were popular with students throughout all the schools visited. Various layouts have been adopted ranging from completely open plan studio arrangements to more enclosed traditional classrooms with shared storage areas. The more open plan spaces tend to provide a more flexible working arrangement, however these are successful to varying degrees depending on staff preferences and overall management of the space. Some successful layouts were semi open plan, offering teachers some acoustic and visual privacy whilst still providing a more relaxed and stimulating environment in which to work. A semi open plan arrangement also provides good wall space vital for the easy display of student artwork.

Daylight from the north, which is generally regarded as the ideal, is adopted in many designs. Where these windows offer increased levels of daylight the use of artificial lighting throughout the teaching day can be considerably reduced. As many art departments are located on upper levels to permit views to the surrounding landscape, the use of north facing rooflights is common. These worked well where dim-out blinds are provided to reduce or eliminate glare, particularly during times when the use of interactive whiteboards or projection screens are necessary for teaching.

Classroom layouts are generally successful, however many of the points raised relating to room layout in general are equally applicable here. Much could be done to improve the specification of FFE within classrooms to ensure that the correct sinks and types of under bench and wall storage is provided. For example in some schools large shallow Belfast sinks were specified to allow for screen printing and paper stretching, whereas this has been omitted in others.

Specialist storage for art classrooms, particularly where both 2D and 3D classrooms are provided, is generally successful where the amount and type of storage has been adequately specified. Where specific length or depth of shelving is required, or where particular paper storage units are required, this must be clearly detailed within the RDS.

Provision of facilities for a ceramic kiln have been seen to be inadequate where this is not specified as a separate room properly designed with suitable ventilation and clay storage. Where this cannot be properly controlled i.e., where the kiln sits within the classroom it has prevented proper use by students for Health and Safety reasons. Generally the requirement for a specific dark room is being replaced by the wide use of digital photography.

Display space is of paramount importance in this department, and is required for both 2D and 3D artwork. Displaying students' work outside of the department also allows those students and staff that do not normally cross the threshold the opportunity to benefit from what is going on within, and can help to enliven the school as a whole. Full height display pinboarding, from worktop to high level, worked particularly well in one instance. The best results are seen where display has truly been considered, and if possible discussed with the staff who will manage the department.

In some schools, a separate room is briefed for senior students who wish to take art at a Higher Level, particularly those who are preparing portfolios for further education. This room needs to be as functional as the classrooms allowing the students freedom to develop more specialist techniques. Many schools have been provided with an external art terrace, often as an addition to the brief where the design naturally affords this opportunity. These however are underutilised, generally due to Health and Safety concerns or issues surrounding student supervision. If external viewing terraces or art spaces are required these need to be more clearly considered to maximise their potential.

Points to consider –

1. **Classroom orientation and maximised use of north light and roof lights where practicable;**
2. **Whether a semi open-plan arrangement is more useful than closed classrooms;**
3. **Clear and detailed description of all FFE items necessary to support the curriculum;**
4. **Description of minimum storage required avoiding use of terms such as 'maximise', 'adequate' or 'sufficient';**
5. **Separate Kiln Room if a kiln is required for student use;**
6. **The provision and proper function of an art terraces or external viewing galleries;**
7. **Clearly detailed display requirements both inside and outside of the department; and**
8. **Provision and function of senior art spaces.**

Building Bulletin 89 Art Accommodation in secondary schools (BB89) was referred to in many ARs and it along with other available guidance contains a lot of good advice and design criteria that should be considered throughout the design process. However an appraisal of this must start at the brief preparation stage so that Clients are aware of the criteria being set for designers and do not create conflicting requirements by including references to the Building Bulletin. For example BB89 gives clear guidance on the size and type of accommodation a school art department requires, but it can be observed from some Client documents that their own briefed area falls short of that recommended. BB89 is also very clear on the requirements for storage for both general art resources and also of more specialist items of equipment and resource materials; designers make reference to BB89 where the Client's brief lists inadequately sized storage spaces making compliance difficult if not impossible.

If the recommendations of BB89 are considered by the LA to be best practice then these need to be written in and incorporated into the brief text. That is to say that those writing the new brief for designers need to be fully aware of the recommendations of BB89 from the outset and any

limitations that their own criteria place on their design teams. Building Bulletins should be seen primarily as a guide to both Client and designer throughout the whole design process.

13 – Music and Drama Department

Many schools offer a distinct drama space/studio, and the most useful and indeed practical arrangement is where this occupies the rear stage area within the assembly hall or auditorium. Good use can be made of the lighting and other specialist functions of the stage during these classes, with added value achieved where the assembly hall itself can be used as a teaching area. There is a slight disadvantage to this arrangement when the assembly hall is used during exam periods, as noise transfer from the drama area can be disruptive even when an acoustic partition is used to separate the drama area from the hall. If this arrangement is adopted, provision for alternative drama space during exam time must be sought to minimise disruption to this subject, or the situation viewed as an acceptable compromise. This alternative space could range from an external covered amphitheatre in summer, to a flexible workspace/classroom during the winter months.

Generally the layout of music classrooms was good, with those offering an open area for group play/performance the most successful. Music is an expressive art, and designers/Clients must cater for flexibility of use particularly in these classrooms. Perimeter worktops with pull out keyboards can leave the centre of the room more adaptable, allowing a number of alternative layouts to be achieved. The introduction of acoustic partitions which allow two rooms to become one for larger classes can work well, however the acoustic standard of this partition must be particularly high if good separation is to be achieved. The provision of a recording room between two classes worked very successfully in several schools.

Practice room provision was generally of a good standard throughout, though some work could be done to ensure a standardisation of size, for both small and large rooms, as this varied greatly. Again acoustic separation of these rooms is vital if they are to be well used by students, and consideration given to the environmental conditions if it is to be conducive to valuable practice time. External views can greatly improve the feel of these rooms, and viewing panels in doors must be sufficiently large to avoid the practice rooms resembling cells. One school offered two additional soundproofed booths in every classroom, which were well used and liked by staff members and offered a valuable addition to the classroom facilities.

Storage for musical instruments was a major issue in the majority of schools. Where this was successful, clear direction had been given to the designers as to the types and number of student instruments to be stored, which resulted in suitable shelving for all instruments, and a secure room for students to leave their valuables during the school day. In this particularly successful instance, storage for instruments was briefed in addition to general departmental storage.

Points to consider –

1. **True flexibility in classroom layout;**

2. **Provision of acoustic partitions which are of a high standard to allow two rooms to become one, yet function well separately;**
3. **If the drama space is to be used throughout exam periods provision of a separate drama space should be considered. Consider sprung floor and mirrors to one wall to accommodate dance and further increase flexibility. Ideally drama spaces should be large enough to be used as small performance spaces;**
4. **Understanding of the increased levels of IT required in modern music teaching, together with facilities for group play and performance which seemed particularly popular;**
5. **Easy access to larger performance spaces with suitable additional recording facilities within the assembly hall for orchestras, choirs and school drama productions;**
6. **More precise requirements for instrument storage over and above general dept storage; and**
7. **More inspiring practice spaces, particularly those for group practice.**

Building Bulletin 86 Music Accommodation in secondary schools – a design guide (BB86) was referred to in many ARs and it along with other available guidance contains a lot of good advice and design criteria that should be considered throughout the design process; however an appraisal of this must start at the brief preparation stage. Designers are often asked to comply with this document and its guidance, as the recommendations it contains are seen as best practice in the design of music spaces. Unfortunately it can be seen from many project briefs that Clients themselves are unaware as to the criteria it is asking its designers to meet, as their own documents conflict directly with the Building Bulletin.

If the recommendations of BB86 are considered by the LA to be best practice then these need to be written in and incorporated into the brief text. That is to say that those writing the new designers brief need to be fully aware of the recommendations of BB86 from the outset, and any limitations that their own criteria place on their design teams. Building Bulletins should be seen primarily as a guide to both Client *and* designer throughout the whole design process.

14 – Science Department

Science laboratories on the whole seemed to work successfully in the majority of schools. There were a wide range of areas adopted with the brief ranging from a minimum of 70m² to 90m². It was noted that larger laboratories resulted in fewer negative comments from students and staff members. Layouts of science laboratories also varied from school to school. The most positive comments came from those where student experiment benches were located round the perimeter of the room, leaving the remaining central space more flexible in its use. Locating experimental space to the perimeter allows all students to write up work at centrally positioned desks. Rooms which displayed the use of perimeter benching with peninsular sections were also seen to be successful. Where centrally located serviced 'pods' were used, those which adopted integrated services from below worked better than those with serviced poles from the ceiling which were criticised by both students and staff as they disrupted sightlines and generally looked untidy. Dado mounted trunking was adopted in the majority of spaces for electrical and IT provision; great care should be taken to ensure that these points are positioned such that they are a safe distance from sinks and any water services. Designers should consider the seating layouts for students to ensure that students do not sit with their back to the front of the class, where viewing the whiteboard can be difficult.

The majority of laboratories relied primarily on natural ventilation, with supplementary ventilation or extract provided where required. As in many other teaching spaces this resulted in overheating of the spaces when blinds were drawn, as windows were often closed to avoid damage to the blinds on windy days. This was a particular observation in physics classrooms where the requirement blackout blinds limited the ventilation rates even further when these were drawn during experiments. In all science laboratories, the use of perimeter benching made the opening of both low and high level windows difficult due to the reach across these benches. Where Teleflex or similar remote opening systems were adopted to ease this at high level, the need for dim out blinds to be drawn to allow students to see either interactive boards or projection screens properly again resulted in lower levels of natural ventilation.

In some schools radiant ceiling panels were used to heat laboratories. The requirements for perimeter benching make the installation of wall mounted radiators difficult.

Generally the provision of technician's workspace and departmental storage was commented as being good, although there are vast differences in briefed provision seen across all schools. Chemical storage was criticised in a number of cases, primarily due to the levels of mechanical ventilation supplied, and the provision of washable flooring and corrosion free shelving to these rooms varied greatly across the schools visited.

Points to consider –

1. **Ventilation to science laboratories. Reliance on natural ventilation that conflicts with requirements for dim-out/blackout blinds, and difficulties in reaching opening windows;**
2. **Layout generally. Serviced perimeter experiment space ideal with greater flexibility of layout to the central area of the lab;**
3. **Consider ideal layouts where students are not forced to sit with their backs to the teaching wall;**
4. **Greater consideration to be given to the briefing of specialist storage space, particularly FFE and ventilation rates/requirements. Chemical stores in particular require attention; and**
5. **FFE provision generally. Some schools noted that high taps above small sinks resulted in water often being splashed onto surrounding benching/flooring.**

Building Bulletin 80 Science accommodation in secondary schools –a design guide (2004 Revision) (BB80) was referred to in many ARs and it along with other available guidance. BB80 also contains numerous layouts for science laboratories, and it is imperative that the merits of each are discussed to establish a clear preference early on in the process. Guidance is given on everything from finishes and furniture choice to suitable furniture and services installation.

If the recommendations of BB80 are considered by the LA to be best practice then these need to be written in and incorporated into the brief text to avoid any conflicts or misunderstandings within the brief. BB80 offers a number of possibilities and not one distinct solution, so if it is to be used it is important that all involved in the briefing process understand the contents of this document.

15 – Home Economics Department

The provision of Home Economics teaching and support spaces and their layout varied greatly across all the schools visited and these rooms generated the greatest number of comments from teaching staff. As was observed in science laboratories, the area of these practical classrooms varied widely from school to school, with smaller rooms suffering the most negative comments regarding overall layout. Many schools had generous preparation and storage spaces to support classroom activities, whilst some suffered from a lack of these areas, particularly where the department itself was relatively large in terms of the number of rooms. Not all schools offered facilities for Fabric/Textile classes.

In general the layouts were all designed using perimeter and peninsular benching with varying degrees of success. Layouts receiving positive feedback generally offered generous clear areas at the end of each peninsular bench section for students to either prepare or cook food safely, or to undertake written work where views of the teaching wall were critical. These areas had integrated power points to allow students easy and safe use of portable and hand held kitchen equipment. Where these areas attracted criticism, it was because the safety, general cleanliness and operation of the room was compromised and made teaching difficult. Again layouts which allow good view of the teaching wall, which prevent students sitting with their back to the teacher, are ideal although this may considerably increase the general dimensions of these classroom types. One solution to this problem could be the provision of practical classrooms supplemented by more general classrooms where theoretical work could be undertaken.

As in science laboratories, the provision of dado trunking to perimeter walls was adopted to provide additional points for microwave ovens and IT facilities and similar issues were witnessed in relation to the safe positioning of these in relation to sinks. Clear areas for the location of these facilities need to be incorporated within the room layout as was seen in the most successful rooms.

The most positively commented departments were those where preparation space, food storage and chill areas were provided in addition to the classrooms. Those schools where these spaces had not been clearly briefed suffered and storage of equipment and foodstuffs within the rooms became a major issue. The location of these support spaces between two classrooms, or certainly at the centre of a department, worked well where they were provided. Where a separate chill room was provided this was extremely well used and staff saw this as an essential requirement.

Overall the storage in classrooms was reported to work most successfully where this was clearly detailed within the project brief and designed to store specific items. Facilities for disabled students were generally well provided and will include all the facilities offered to other students (such as oven and grill). Care must be taken to ensure that areas for hanging aprons etc. are accessible to students and can be properly used. The teacher's table or demonstration bench, if provided, must be positioned so as not to obscure student's view of the teaching wall and any interactive whiteboards.

At least one school had briefed the provision of a commercial catering kitchen to support the curriculum. This provided resources for standard class teaching and allowed more specialist classes to be taught for students who may wish to take this subject further into a career. More specialist kitchens can also be used by outside catering companies, or by students for school events, if appropriately located adjacent to the schools assembly and common spaces.

A number of comments were raised on the standard of the domestic goods provided, particularly in laundry areas where the domestic washer/dryers provided were not seen to be robust enough for constant use by students. The specification of flooring type, normally vinyl or linoleum, must be stipulated at a high enough slip resistance and be of the 'non-grained' variety to permit easy cleaning.

Points to consider –

1. **Classroom layout generally. Space must be provided for students to work safely and undertake written work as well as cooking;**
2. **Ventilation and heating. Reliance on natural ventilation that conflicts with requirements for perimeter benching, and difficulties in reaching opening windows;**
3. **Location of electrical and IT services to permit the safe use of kitchen appliances and IT facilities;**
4. **Provision of additional and properly briefed storage, preparation and chill areas even in smaller departments; and**
5. **Review of the standard of domestic appliances provided.**

16 – CDT Department

Craft design and technology teaching spaces and workshops were generally reported to be working well throughout the schools. Excellent provision was made for access to specialist equipment and most schools reported few difficulties in successfully operating the spaces available to them. The types of rooms provided within each school were generally similar, although there were again wide variations in area and in some schools the brief seemed to have specified a better range or mix of spaces.

Despite this there was some room for improvement in a few areas. The provision of safe staff preparation areas with adequate storage for deliveries of materials and access from an external service area varied significantly. There was evidence of both successful and unsuccessful arrangements in this regard, but critical feedback was primarily received where either the space was too small, or where the location and adjacency of rooms to the main workshops seemed slightly awkward. Better and more robust detail in RDS and a review of provision in area terms could help eliminate this issue on future schools. Access for deliveries should also be a stipulation in RDS.

Increased storage provision was a common request in many schools. Storage areas within this particular department need to accommodate a wide variety and size of equipment and materials.

Workshop layouts were generally very successful and no major issues were reported by staff or students. In one school there was a successful and flexible approach to the layout, where particularly specialist areas, such as hot metal working and forge areas, were located between the main workshops with access controlled by means of roller shutters. This allowed two classes access to the same facilities, and ensured that these areas were locked off when not required, which increased student safety.

Mechanical dust extraction was provided in the majority of schools, and this was seen as essential by CDT staff. Centralised dust extraction was seen to be the best solution; however this caused a few acoustic issues where its use in one room disturbed the teaching in an adjacent workshop. If this system is seen as desirable, provision should be made for the system to be isolated per room, which can be achieved by simple routing of the ducting system within the design.

Flooring type is another area where the solution varies greatly across all schools, and with varying degrees of success. Finishes ranged from non-slip vinyl to painted concrete, and both were reported to cause some issues either with slip-resistance, cleaning, or general safety.

Points to consider –

1. **Layout and adjacencies to be better described within the standard brief;**

2. **Storage and staff preparation spaces to be suitably sized for their function;**

3. **Centralised dust extraction with the ability to isolate between rooms required; and**

4. **Flooring specification to be further investigated to eliminate issues with cleaning and slips.**

17 – Main Entrances

Most new schools had a clear and visible main entrance which was easily identified by visitors, staff and students. In the majority of schools visited the main entrance areas provided a secure entrance lobby where control could be exercised over visitors. Generally these areas were reported to work well, however there were a number of minor areas where improvements could be made to the layout or operation of these spaces.

External signs to signify entrances were well designed in many schools. In some schools however this was lacking and although the main entrance was visible, some additional signage would have been helpful, especially in campus schools, or those which had separate community entrances. Requirement for this signage is written into all project documentation, however obvious budgetary constraints at the end of a construction period can leave little funding for this key element.

The secure reception area will allow for visitors to sign in to each building and provide for both ambulant and disabled visitors to do so easily. The majority of schools had a separate desk and hatch for student access; this was unsuitable successful in some areas where there was no acoustic separation from the main street area where students tend to congregate. Disturbance to admin staff could be avoided were this student access located via a separate lobby, or where some form of acoustic separation is provided. Where the reception desk in some schools had been provided as an open plan arrangement, with no acoustic barrier between the reception desk and the admin office, such a barrier was being retro-fitted to maintain a quieter working atmosphere within the admin office behind.

In general, both FM staff and reception staff shared the responsibility for control of the main entrance area, providing access for FM subcontractors and school visitors to be admitted and signed in. Where the FM staff areas were located away from the main entrance, this was commented on negatively in these particular schools.

Access to the majority of schools had been specified as requiring automatic doors to the main entrance for all visitors. These were generally controlled via sensors, with additional push pads provided for some doors specifically designed for disabled visitors. Many schools reported operational difficulties with these entrance doors, and there were many instances where the doors did not function correctly or required continual maintenance. The requirement for these entrance doors to provide too many separate functions can be seen to be the cause of at least some of the problems. They are normally required to permit automatic entrance to all visitors (to the security lobby), to have the provision to be lockable and finally function as escape doors in the event of fire. There are often conflicting requirements in trying to achieve all of these functions, and the complexity of the operating systems or indeed requirements needs to be simplified if issues of damage or failure of these doors are to be resolved. The issue is compounded still further where student entrances are provided and not used correctly, and students are permitted access via the

main entrances. This additional traffic places unnecessary strain on the doors, which are often not designed to cope with such additional traffic on a daily basis.

Points to consider –

1. **Function of security lobby and ease of operation from an admin staff/FM perspective;**
2. **Position and location of student reception desk to avoid disturbance to admin staff;**
3. **Acoustic separation of the reception area from the main admin office;**
4. **Co-location of FM or caretaker at the main entrance, with shared responsibility for visitor access;**
5. **Provision of automatic entrance doors. Consideration should be given to the specification of manual doors to the main entrance, with separate disabled push pad to one set of doors only. The majority of schools had two sets of entrance doors so this could easily be achieved;**
6. **Where provided, encouraging proper use of student entrances to avoid placing undue stress on main entrance doors not designed for this purpose; and**
7. **Consider asking designers to ensure that the main entrance doors are not relied upon as a designated means of escape. If other designated escape routes are available nearby, then these doors would not require emergency push bars which can conflict with some of the other functions of these doors on a day to day basis.**

18 – External spaces

Throughout the schools visited hard and soft landscaping was used to good effect complimenting areas of hard play space. In many newer schools it will take some time for the results to become apparent as the sites mature, however the levels and types of planting appeared appropriate throughout.

External student social space was provided to varying degrees on most. Successful arrangements were those which provided a number of different spaces, often between buildings or in the form of landscaped courtyards with the most positive feedback coming from those schools which allowed students access to these spaces and where they were not simply seen as nice areas to overlook. Access to these external courtyards can present difficulties for management staff, where external doors create a 'breach' in the schools security system. In one particularly successful design, this issue had been resolved by allowing students access to courtyards which were surrounded on three sides by the building itself, and secured from the surrounding site by unobtrusive fencing. Students felt that they could access the outside spaces more freely, and this arrangement also allowed routes through courtyards to be used between classes.

Students would generally benefit from a greater provision of seating; this could be incorporated into the overall landscape strategy and not in the form of street furniture. In some schools, artwork by local craftsmen could be seen in the form of railings, or sculpture etc., and this was well received by all in addition to providing schools with a sense of local identity.

The greatest improvement in external space could be achieved by the provision of greater areas of covered space for students to socialise or even dine in the warmer months. Many students reported that they would spend more time outside if some shelter from wind and rain was provided. If this element was incorporated into the brief as a clear requirement, it would offer opportunities to achieve shelter by using the building's form and orientation, rather than relying on the landscape alone to provide this.

In most schools, areas had been successfully provided to encourage wildlife and varied ecology and these were also used for teaching. In many schools this area was segregated or fenced off to minimise any risk of vandalism or provide protection to plant and animal species. It would be refreshing to see a more holistic approach to this topic, which could involve greater areas of the site and increase students awareness of the issues, which is generally good, but it is accepted that this would involve greater maintenance and a clear strategy for management. Green issues are however a big part of most schools curriculum and should be an integral part of the briefing process.

Areas for planting and growing vegetables were provided in one school, and proved popular with both students and staff. This area was also used as a teaching space as part of the curriculum, and additional facilities were provided for student changing and storage of teaching materials. It is

unlikely that this would be required in all schools, however could be considered where horticulture is a feature of the local economy to increase student's options for qualifications.

Points to consider –

1. **Greater student access to well designed and adequate sheltered areas;**
2. **More seating for students within varied areas of the landscape;**
3. **Better access for students to their external spaces;**
4. **Encourage work from local artists and craftsmen; and**
5. **Greater school involvement in the site as a whole.**

19 – Student lockers

Students were given access to lockers in the majority of schools visited and these seem to be considered an essential element of any new school design. Although popular with students and generally well used, the success with which these had been installed varied to a degree for several key reasons.

The position of student lockers must allow for easy supervision, albeit passively by staff members and should not be located in areas where students may become isolated. Students must be also given sufficient clear space at locker areas to avoid congestion at certain times of the day. In many schools a student was expected to visit their locker first thing in the morning and at lunchtime only, as doing so between class changes was unrealistic and would more than likely add to congestion throughout the day. In general, lockers should be situated reasonably centrally adjacent to student access points and in suitable groupings that minimise congestion. From the feedback it is recommended that all students are provided with a locker, though this was much harder to achieve in the largest schools of 1500 students or more due to the volume required and the area these would take up.

Lockers were provided in either banks of two or three high. In one school the lockers were very small and students tended not to use these for this reason. Lockers that are three rows high can cause some congestion, as three students are all trying to access their belongings within the same small narrow area. The ideal would seem to be two rows high, with 900mm height and 300mm width for each locker as the minimum. Some schools had lockers sited along corridors, which is a good solution if the width of the corridor is not compromised by the addition of lockers and kept at the minimum recommended.

Vandalism of lockers was evident in only a minority of cases and the standard of lockers provided and the locking mechanism chosen had a great influence on the amount of damage experienced. Lockers situated within PE changing areas, which are generally provided for community use only, suffered most damage by students and based on the feedback received it would be recommended that these are sited within corridor spaces to maximise supervision and reduce the chances of student vandalism. An assessment of the locker types available for students and in particular the locking mechanisms available needs to be undertaken if these are to be a long term solution in the new schools.

Lockers that are built into the walls, or within a 'goalpost' arrangement seemed to be the neatest solution, as those lockers that were simply placed up against a long wall looked like an afterthought in some cases. In addition, lockers not built into the fabric created unsightly dust ledges. This was particularly evident where the tops of lockers could be viewed from the upper level of a double height space.

The opportunity to inject a bit of colour into the schools by using coloured lockers was not taken advantage of in most schools. A standard grey or white locker was the norm.

Points to consider –

1. **Location of lockers adjacent to main street or social spaces and close to student entrances;**
2. **Adequate circulation space to prevent congestion and minimise opportunity for bullying etc;**
3. **Type of locker provided to be of a suitable size and robust enough to withstand constant student use;**
4. **Lockers built into the wall fabric and not simply placed against a free wall area;**
5. **Consider the use of colour to help enliven the locker and social areas; and**
6. **Provision of additional bag storage in practical classrooms.**

20 – Student toilets

Many different ways of providing and designing main student toilets were observed during visits, however two options were more prevalent. The first was to locate all student toilets in one area, usually on the ground floor adjacent to student playground entrances and dining, and this was particularly observed in some of the smaller schools visited (under 1000 students). The second was to spread the location of toilets throughout the school, particularly those larger schools, with a proportion located adjacent to the main student social/dining spaces. It was interesting to note that those schools that had a spread of facilities reported greater student management issues. In one school in particular toilets on the upper floors were locked during class times, as it was accepted that students would not require these between lessons, using them only at break times.

However, consideration should be given to the potential issues associated with allocating all toilet facilities in one area or block. For example, problem occurring within this space or linked utilities could require the whole school to be closed whereas a number of separate and disconnected facilities may permit the use of the building to continue, albeit with a temporarily reduced number of toilet facilities.

The best solution to resolve these issues would seem to be the location of student toilets primarily in central areas, where students are likely to pass through on a regular basis. If these can be positioned such that students have access to them adjacent to dining, social spaces and student entrances this would seem desirable. Care should be taken however not to provide too many cubicles in each room, as this can cause congestion and lead to greater risk of vandalism. At least one school has been designed to locate the boys and girls WCs at either end of the main social dining 'street'. This was successful in that it not only spread any use of toilets throughout the whole space and limited congestion at key times, but also offered a degree of privacy for students of either sex.

Generally the layouts were sufficiently generous, and of a consistently high standard in terms of the finish of cubicles etc (though opportunities for colour were not exploited as fully as they could have been in some areas). The majority of sinks were provided within vanity units, all cubicles had IPS and hand driers were generally adopted as the most manageable solution. It was noted in some toilet blocks, particularly where there were in excess of 8 cubicles per room, that hand driers positioned only at the ends of each row of sinks resulted in water spillage on floors.

In at least one school visited, an 'airport style' layout was adopted, where entry to both the boys and girls toilets was via a staggered wall arrangement without an entrance lobby, which can sometimes become congested. This seemed to work well and is popular in some schools with staff who felt that management of these layouts was more easily controlled. Vandalism did occur in some schools; however this was generally quite rare. Fittings in student WCs need to be very robust to stand up to the constant wear and tear, Toilets with low ceilings, or which were specified with lay-in tiles seemed to come off worst, and certainly some LAs specify that only plasterboard ceilings with a minimum height are used in these areas. Ceramic tiles were common throughout, and seemed at

least to be vandal resistant, and in one school, the use of jointed plastic wall sheeting to WC areas was noted.

It should be noted that in addition all schools exhibited good facilities for disabled students, with the required locations of assisted or disabled WCs evident in most schools.

Points to consider –

1. **Location of toilets in centralised locations in close proximity to student entrances, lockers and social spaces. Avoiding toilets being locked off;**
2. **Consider risks associated with toilet strategy in respect of a potential impact of unavailability of toilets on whole school availability;**
3. **Limit to the number of cubicles in each room to minimise congestion and vandalism;**
4. **Consider whether an 'airport style' arrangement with more modern signage could be adopted throughout; and**
5. **Greater use of colour, especially to identify entrances and avoid interiors which can be too 'clinical' in their appearance.**

21 – Internal and external finishes

Internal Finishes

Internal finishes across all schools were from a fairly standard palette, and reflected similar approaches to the main spaces within each building. Most ARs simply call for internal finishes which are robust and easily cleaned, with specific references made to particular grades of material, or additional criteria only where these are seen to be essential. These additional references tend to relate to specialist classrooms where specific references are made to chemical resistance, slip resistance, etc.

Most Authorities ask for internal finishes to be submitted via a process of 'Reviewable Design Data' or RDD. Final sign off of finishes schedules is usually at the Authorities discretion.

Walls

The finish on the vast majority of internal walls was painted plasterboard, generally used where metal stud partitions formed non load-bearing walls to classrooms and offices. Common painted blockwork was also extensively used, primarily in areas where heavy use was anticipated in areas such as corridors and toilet areas. In general specific internal finishes were not stipulated within AR, other than the specific references to criteria such as robustness, ease of cleaning or smooth painted finish etc. Some Authorities had however stipulated the use of blockwork to main corridor areas.

Most of those interviewed reported no negative comments regarding the use of blockwork to corridors. This was popular in most schools due to the robust nature of the finish and particularly by FM due to ease of maintenance. In a number of schools this blockwork had been painted to achieve splashes of colour however the success of this was generally affected by the overall quality of the blockwork finish which varied. In at least one school fair-faced blockwork had been used in heavily trafficked areas, which provided a robust low maintenance finish.

Corner protection in corridors was common and had been retrofitted in some, particularly where a plasterboard finish had been used, and this was much needed in schools with narrower than average circulation. In two schools, vinyl protective sheeting had been retro-fitted to a height of 1.5m to counteract problems experienced with damage from students' bags in heavily trafficked areas.

The quality of finish in certain low-use areas is one where economies can be made and some schools had simple painted blockwork to storage areas with no apparent detriment to the use of these rooms.

Several schools had incorporated high level decorative and acoustic panels in larger spaces such as sports halls, social spaces and some of the larger circulation routes. These not only create a visually pleasant environment, but greatly enhance user comfort through improved acoustic performance.

In some schools with plasterboard finish, there were issues with the quality of the paint used with respect to durability. In one, the removal of wear and tear scuff marks was demonstrated, which

resulted in the paint being rubbed off. The conclusion from this is that careful attention needs to be paid to the type of paint specified to get the balance between durability and aesthetics.

Floors

Flooring throughout the majority of schools was similar and generally of a reasonable quality. Vinyl was used throughout the building for circulation areas and stairs, with more specialist vinyl specified in some teaching classrooms, workshops and laboratories. Carpet was used for most classrooms, and tiles were seen to be more convenient from a maintenance perspective than sheet carpeting. Timber flooring was only used in larger areas such as assembly halls and gymnasia and this was sprung where required and was overall of an acceptable quality.

Problems with floor coverings were generally only reported in specialist rooms and particularly those in Home Economics and CDT Departments. Requirements for flooring in these areas to be slip resistant whilst easily cleaned presented some conflicting issues and these need to be addressed in more detail to establish the optimum finish for such areas. Sawdust or flour on painted or vinyl flooring can result in a very slippery surface but a covering with slip resistance can be difficult to clean. Few LAs gave any guidance as to the levels of slip resistance required, however this issue should be more closely considered to ensure a cost efficient, safe and attractive floor covering is provided.

Ceilings

In most corridors and classrooms, ceiling finishes were invariably suspended systems with standard, hygienic or acoustic inlaid tiles. Where these ceilings are sufficiently high durability is not generally an issue however in schools with lower ceiling heights, particularly in corridors there were many reports of the tiles being knocked out and damaged.

In some practical teaching spaces such as Sports Halls, Drama and Dance, exposed roof decking was often adopted and this solution did not receive any adverse comments from staff or students. Where ceilings are not required, for example in stores, cost savings can again be made.

Doors

Internal doors suffer a great deal of wear and tear in secondary schools. To combat this most schools used magnetic hold open devices to reduce wear on main circulation doors, which worked well particularly where these devices are contained within the side walls.

The introduction of hold open devices also greatly improves traffic flow by eliminating the 'pinch points' otherwise created by corridor doors.

Most schools displayed a combination of timber veneered, laminate faced or painted timber doors, depending on their use and position. Generally the doors themselves were standing up to the daily use however FM often reported that MDF facings to frames and surrounds were not robust enough.

Colour

The use of colour was generally restricted to specific areas to ensure that it had maximum impact. It was evident that some LAs had dedicated specific funds for interior design strategies, and more importantly, managed to ensure that they were delivered. Many LAs reviewed interior proposals closely via an RDD process. Colour was used in many successful ways, from delineating corridor and circulation routes to highlighting major social and assembly spaces. Many classrooms used colour on one wall to brighten the classroom environment and also injected interest through furniture and fittings. Some schools also used colour as a navigation aid, however the merits of this are doubtful as most new students are familiar with the routes around the building within a few days of starting.

Many briefs fail to describe the requirements in terms of interior strategy clearly enough to ensure delivery of a suitable or satisfactory scheme, leaving some schools still 'institutional' in appearance.

External finishes

The schools visited used a variety of materials with varying degrees of success. Texture and interest were provided in many areas through the use of brickwork, timber and metal cladding and coloured panels within curtain walling. Render was widely used, however, injections of coloured render were few. The use of stonework or other natural materials was seldom seen, and use of locally sourced natural materials was not often observed in any schools.

Points to consider –

1. **Quality of internal blockwork where used improved to receive coloured finish. Greater use of fair-faced block or self coloured natural materials to provide colour and interest;**
2. **Use of a wider variety of materials to stimulate visual interest and provide colour;**
3. **Ensure the flooring specification for meets functional requirements of each space;**
4. **A more robust RDD process throughout to ensure that the Client's vision is achieved;**
5. **Consider elimination of suspended ceilings where these are not required. Consider also use of common block to stores and ancillary areas to save on costs, ensuring that this money can be more suitably allocated elsewhere;**
6. **Increased quality of joinery work particularly if future maintenance is to be the responsibility of the Authority;**
7. **More imaginative and widespread use of colour and texture to interiors;**
8. **Achieving a better balance between exterior and interior finishes through stricter cost controls; and**

9. **Life Cycle costs and general ease of maintenance must be considered when selecting materials.**