A CABE research proposal within the 'Building Futures' programme

Learning Environments of the Future

steering committee: drivers…
draft interim report

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key drivers: macro

Throughout the **initial interim report** there was much reference to macro influences impacting on the effectiveness of the design process: changing pedagogy; new technologies; political policy and will. These are key drivers of the change in learning environments that our work signposts. Similarly our **Initial Reflections: impacting trends** paper briefly explored social, technological, economic, environmental, scale, political, and pedagogic drivers.

The initial interim report also explored the micro-influences which our work have shown to be key to the effectiveness of school design: the impact of eye line on the ability of a class to collaborate; the design contrast between individual task orientated learning and more open ended collaborative learning (for example furniture layout in assessment scenarios); the impact of the timetable on what is achievable (we are confident from our work with cBBC that producing good quality, media rich work with children typically requires whole day blocks of time); the inflexibility of laboratory furniture (for example the inability to harness drama based activity to reinforce science concepts) and more.

This report explores the macro-drivers that have emerged as significant for the project. Perhaps a meta level reflection here should be that, above these individual drivers, the pace of change is significantly increasing, requiring some constant iteration.

Building for a constancy of change and indeed for the certainty of uncertainty is not straightforward and requires designs that are far more than just :agile" or 'flexible". This pace of change, above all else, is the primary driver.

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- **Social**

Just as mobility changes diminished the power of the extended family, so information and communication changes are regenerating distributed communities in companies, families and in learning. Current educational political trends are towards 'networked learning communities' of schools and 'federations' of school organisations, which recognise the need for schools to move from a philosophy of competition towards one of collaboration. Although much of this is driven by economies of scale which are currently realised by geographical proximity these will soon be realised by ICT links across considerable distances.

But a much clearer and more powerful social driver is the family. Nearly one in four (22.9 per cent or 2,672,000 dependent children) live in lone-parent families - 91.2 per cent of which are headed by the mother and this is an upward trend that impacts on schools' role and function. A survey of 800 single parent families shows, for example, that when money is tight more than half (53 per cent) still have to skip meals to save money, with more than one-quarter doing so often (28 per cent). Asked what were the hardest things about being on a low budget when money is tight, one fifth said not being able to afford school-related or social activities for their children. It is clear that the school's role in society is thus becoming more important.

Paul Kenny, from the GMB, said: "These figures demonstrate the absolute necessity of employers adopting family-friendly policies to enable these lone parents to participate fully in the workforce." Pre and after-school clubs and other supports for childcare are also essential. This is demonstated by the support for, and development of, school breakfast clubs and summer school activities which enable parents to extend their working hours. Added to the inexorable trend towards a longer learning day and greater community access it is clear that tomorrow's schools will be much more 24/7 institutions than today's, with profound implications for facilities within them.

An alternative to this 'extension of school' vision is the view that ICT and the development of collaborative, community, virtual learning (as seen in Notschool.net, Discovery 1 and the Warwick Learning Programme) will enable pupils to demonstate concurrent learning, and may free schools from the view that learning only takes place in a learning organisation. Hence the possibility of flexible day / week becomes a reality. The function of schools as 'childcare' organsiations for working parents will militate against this and it is, perhaps, an economic debate about which will "win".

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Finally, one interesting social trend to observe is the move towards a more litigious society. If we take school toilet design for example, it is clear from much good exisiting research that children try to avoid using toilets during the school day. This translates into a loss of concentration during the afternoon as a result of dehydration and an increase in urinary tract infections. Given that this is known and documented, why wouldn't parents sue for the impact of this loss in attention thresholds, or health. Sooner or later they will and presumably it will be "negligent" designers that they sue?

The short summary of this driver in design terms is this:

schools' increasing social functions need to be designed for;

the 24/7 school is more rather than less likely

litigation will impact on the quality of school design

- **Technological**

The history of learning technology encompasses a number of clear cycles. Our widely circulated Ultralab's Law from the early 90s suggests that "With new technologies, between denial and adoption is the space for innovation and that is where radical progress is made" and this can be observed with every emergent learning technology from ball-point pens to smart phones. It is clear that we are in that space in 2003; we have indeed observed some radical progress in a number of schools globally, largely predicated on technological change; this should be a fertile time for school design.

. Technology is evolving rapidly. Gordon Moore observed his rather more famous "Moore's Law" in 1965, just four years after the first planar integrated circuit was discovered. In his original paper, Moore observed an exponential growth in the number of transistors per integrated circuit and predicted that this trend would continue. It has so far. This has profound implications for schools as today's phones, for example, have the processing power of about a ten year previous desktop microcomputer and might be expected to progress at the same rate. We are already seeing the profound effect of this as the "computer suite" with its fixed rows of CRT monitors and fan cooled, noisy, CPUs begin to look like inflexible dinosaurs alongside the freedom and flexibility that schools are finding with portable and wireless technology. Thus the trend sees small and personal equipment becoming steadily more commonplace, affordable and powerful whilst schools attempt first to ban and then to inspire their use before governments intervene to promote and then mandate adoption. Schools are currently encouraging to personal computer ownership at home, whilst rather less are encouraging "bring your computer to school" and most are discouraging to the use of mobile phones in the learning environment. It was the same with ballpoint pens and then calculators in previous decades.

In each country progress is reported as rapid, often more rapid than expected. In Scotland the 2001 School Census showed that the target ratio of 1 modern computer for every 5 pupils had been achieved a year early. Significant progress was also reported in primary schools, where there was 1 computer for every 11 pupils compared to 1 for every 18 in 2000, and primary Internet access had risen from 64% of schools to 84%.

There is an inexorable trend with learning technology from the central, controlled and provided to the personal and individually empowering. This is not a simple, linear change, but a frenetic tug-of-war with an observable trend line on a cyclical and unstable baseline underpinned by a concern over equity. With calculators we moved from "they won't

matter, ban them" to " we should buy some class sets" to "don't forget to bring your calculator to the maths exam" in three decades. It will be faster with computers and faster yet with phones. This is immediately translated in design terms into a tension between provision and enabling. The schools computer suites or a wireless network for personal ownership? between provided whiteboards or ubiquitous projectors for teachers' laptops, between places to watch others' broadcasts or participative spaces to make and stream your own video.

Phones, interestingly, may have evolved too rapidly to ever become institutionalised, they are never "centralised", rarely "provided", and may pass straight to the acceptable personal ownership stage. As a learning technology they are potentially the most powerful of all; they are always "symmetrical" in nature (as soon as telephone technology let you see video you could also contribute it) and we are clear that they are as, if not more, important to learning than computers. Personal equipment requires shared collaborative space and whether it is the media rich wall spaces of the Australian School for Maths and Science, the valued projection screens of many current new schools or the ubiquitous plasma screens of corporate Britain, design attention needs to be given to the need to share with medium and large groups the work on small screens.

We are dismayed to comment that school halls and assembly spaces are particularly poorly designed in this respect. How a space for celebration, performance and information exchange can be so universally appallingly designed beggars belief in the 21st century. We saw, and heard of, countless schools where inadequate curtains on highlight windows, poorly controlled ambient light spilling onto the "stage" area, and a complete lack of forethought about the installation of projection equipment made it completely impossible for pupils or staff to harness ICT capabilities with a large audience other than at night. This might have been foolish in the 1980s but it is frankly negligent now.

Designing for a world where pupils bring a wide range of information and communication technologies through the door with them, and expect them to work as a learning tool, is a simple but obvious way to make school design forward facing and we have seen and documented some innovative school designs embracing the inevitability of this already, but it is rarely the case that teachers vision and architects understanding is translated into the ICT infrastructure's design which is, generally, imposing and constraining by intention.

There was a clear consensus amongst all the heads we spoke to in new build schools that designing in ICT requirements at

the outset, rather than bolting them on afterwards, was the only way to ensure anything like an adequate provision for today's (let alone tomorrow's) learning. To a large extent this task is currently left to wiring or ICT contractors but we see it as an essential design task at the outset. We lost count of the number of projectors we observed with trailing leads precariously balanced in classrooms because no one thought at the designs stage that children and teachers might want to share their ICT enabled work in whole class situations. We were similarly dismayed by the number of new classrooms we observed without even a single internet access point, or without one anywhere near the class focal point, or where the wall structure and design precluded wireless technology from connecting learners.

To date, technology has done a rather poor job of eliminating the most wasteful and tedious administrative functions from schools, but there is a real sense of rapid change beginning to occur; for example registration is currently handled poorly with tutorial groups and all the room, timetable and movement implications that go with it. But schools like Chafford Hundred introducing smart cards now have pupils logged in and out of the premises, saving valuable time, reducing the design need (in organisation and architecture) for dedicated space. We are confident that this will continue radically to impact on schools organisation design needs.

The short summary of this driver in design terms is this:

children will move around school substantially less;

they and their teachers will want to show to each other what they are doing and to the whole class, whole school, whole community, in daylight. Provision for this needs to be designed at the outset.

ICT is part of the essential design of the school, not of the "after build" infrastructure

what the school provides today the students will bring with them tomorrow (although for a few there will always need to be a loan stock as there is now with pencils and calculators) and they will expect it to work effectively.

Computer suites will almost certainly be a waste of space.

- **Economic**

Put simply, education is in part driven by an economy's needs; what the economy needs varies over time. We are currently at a time of variation and thus of change. Inevitably education is cautious, conservative even, in nature and needs to see economic trends confirmed before the curriculum and pedagogy move so meet them. In the agrarian age learning, like production, was small scale, one on one. It was located in existing institutions: the family, the local community, farms, craft teams. As the economy moved on into an industrial age, learning became based on what became a familiar input output model, seeking institutional economies of scale through much larger learning organisations, with a product rather than process focus; the vocabulary of inspectors, standards, performance tables and costs was very much the language of mid-twentieth century Britain. In this economic phase communities were marginally relevant and the alienation, anomie and disengagement that characterised Britain's factories in the 1950s and 60s characterised some schools too. Clearly towards the end of the last century the economy began to be characterised by what some suggest is an information age, but is clearly beyond the agrarian and industrial ages. Whatever the correct term, the economy began to find words like downsizing, agility, collaboration, disaggregation, empowerment, creativity and process more beguiling than the mechanistic vocabulary of productivity. Quality assurance began to superseded the rigidity of quality control. Inevitably this trend is less clearly seen in structurally declining industries and more clearly seen in newer high value industries.

The language of 20 years ago was of capability and quantifiable standards; to accompany this the design of schools spoke largely of efficiency in moving pupils or in heating and lighting, whilst decor was judged by its impact on concentration levels and behaviours. There is now a clear economic imperative driving the needs for agility creativity ingenuity and collaboration. This is reflected in the desire amongst top companies for graduates who have skills in team working, creativity and presentation. Courses and programmes for companies reflect this, for example

> "*Create a team-based culture that will leverage and celebrate differences for greater productivity·!*
> *Recognize opportunities to synergize within the work team, department or organization·*
> *Develop and foster teaming relationships as a source of trust·!*
> *Be a positive model of a team player who is able to implement a sensitive leadership style that promotes collaboration* "

> Asian Executive Experiential Learning

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Education is now recognising these essential economic skills and they are being reflected in educational policy around the world; China and Singapore for example have both embraced "creativity" in their guiding plans for education. Designing a business environment for creativity is very different from designing for productivity as many commercial buildings reflect. Given that education tends to lag behind economic needs conservatively, it is starkly clear that there is some mismatch between what schools think they should be producing, what the curriculum and assessment systems offer value to and what the future economy will need them to produce. Our report signals a real concern that this may lead to significantly inappropriate building stock. For example creative organisations often work in an organic way with teams assembling as they work on overlapping projects; a key skill is the ability to negotiate these collaborations and manage the complexity of multiple working relationships. The traditional school design, both organisationally and physicality, with its emphasis on individual endeavour and single task groups in small dedicated spaces, specifically locks children out of the opportunity to evolve and hone these important economic skills.

These economic imperatives will drive through to learning in schools. Design will, in time, reflect this, but the key debate is the extent to which this clear economic driver is failing to be responded to, in designs, now.

The short summary of this driver in design terms is this:

we should by now be designing for creativity not for productivity;

the structures of school both architecturally and organisationally must soften

- **Environmental**

It is noticeable that architects are often selected for the energy efficiency and environmental sympathy of their designs. It is also noticeable that when cash gets tight these features are the first to be dropped, when the school has sufficient autonomy to do so. This is not because they disagree with the aims, but because there is little help in offering economic and revenue models of the future school; no one says "if you save this amount of energy you will be able to teach in this better way". In other words the capital judgements of the school build are not weighed in any way against the revenue judgements of operating the school. To some extent the simplistic view that "if we build a stunning new school we will attract more students" always outweighs the "if we build an energy efficient new school we will save an indeterminate amount of money in the future". Curiously, it is very rare to hear of architects selected because of the radical impact their designs have had on pedagogy, learning, staff retention, examination grades (although there are some good attempts to minimise bullying); this is because it is easy to calculate heat loss from a building, but tougher to calculate learning loss! Inevitably there is often a mismatch between the design intentions of the school community and the architects.

Whilst impact on the local environment is examined in planning terms, including traffic flows, the cultural and learning impact is considered rarely. Where schools have been designed to bridge the gap between learning and other community activity (rather than simply by the designation of "community school") they have had an often electrifying effect on the local population. Seeing Discovery1 in Christchurch, designed intentionally in a shopping mall to bring the community and learning closer together, and seeing the impact it has, has raises some serious concerns about the extent to which this key aspect is neglected elsewhere. Too often issues of "identity" and "security" end up producing "fortress" schools with a minimal interface with the local community. A litmus test is an exercise we carried out with head teachers: "draw the rough outline of your school on a sheet of graph paper, walk around the school and mark with a cross all those places where the work of your children is shared or celebrated with the local community". Almost without exception the heads returned with a blank sheet of paper; very little imagination has been directed to showcasing children's work to the community the school serves.

Perhaps as a result of this lack of communication of current education's exceptional outcomes, schools also report that planning for more radical school designs often face local opposition as local communities want a "traditional" school. Again, this lack of understanding of current and future learning needs acts as a brake on design; it is hard to imagine a

community wanting, or insisting, on a 'traditional" dentist for example. Communities, in general, have been much more radical in their ability to absorb changes in their retail and shopping lives than in their schools.

We observed only one school where the whole environmental management was transparently open to students. The complex data collected by the environmental management equipment was consciously displayed for students and indeed was used by them in project work. In this way a very real understanding was developing between student's behaviours (for example opening windows in winter) and the impact on the environment (for example through carbon emissions). This simple leap of imagination by school and designers was achieved at minimal cost (the monitoring equipment was already a part of the school's environmental control system - it only required a glass door and a data interface to be added). With environmental concerns being such a significant driver in what is, and isn't, possible in school design, building a clearer understanding of those environmental issues and engaging students in an understanding of them is an opportunity that should not be missed.

But similarly building a much clearer understanding of what learning is, how it can be progressed and nurtured or stultified and lost is an essential task for the architecture profession and a necessary quid pro quo for the massive investment by governments in their building design work.

The short summary of this driver in design terms is this:

environmental issues guide and drive school design, but these are not well represented to the students in them

the impact of a school on the local environment is significant; an understanding of current trends in learning would help local planners to welcome more imaginative designs

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- ### Scale

Large or small; high volume or low volume? Simple economics suggests that in designing containing surfaces large volume is cheaper than small volume. Thus we have large tankers and warehouses. This opens a very interesting debate in school design with a number of unexpected directions:

Schools have so many specific space requirements (like form rooms, libraries, dining areas and corridors) that the relationship between scale and cost is broken. Big schools are substantially more expensive to build than, say, corporate headquarters or superstores. Yet schools that break the need for specialist space have produced some remarkable learning spaces either bigger or cheaper than expected. This trade off between cost and volume is not typically offered at the design stage because of design restrictions.

Open plan schools fell out of favour ten or twenty years ago because of the problems, amongst others, of noise management and lack of privacy and their consequent unpopularity with teachers. On the other hand learning is a noisier activity than it was twenty years ago and sound management is better implemented - open plan offices have helped us here with our understanding of privacy and aural environment needs. Some startling large volume buildings are appearing on school sites, often in some controversial circumstances, but we haven't yet found any large volume entire schools because of the restraints of the planning process.

In Singapore we found very large scale primary schools, with thousands of pupils, operating a two shift day system to fully utilise scarce resources, but the building designs were broken up by colour coding or other design devices into effectively smaller units. Groups of around half a dozen schools would share in a cycle of replacement and renewal so that at any time one of the group would be seeing their school replaced. In some instances the "new' school community would be learning within another school as they waited for their own school to be finished. These high volumes allowed relatively cheap building costs, a cycle of constant renewal and consequently a very agile school building stock. When the government decided to add life science laboratories to all primary schools (because of a burgeoning biotech global industry) this could be achieved within less than a decade.

On the other hand given the emerging trend of mixed age teaching, there is little work to suggest other than that very

small schools offer viable and delightful learning environments. The principle reason for high marginal costs in small schools is not architectural but admin. and it is clear that this is a problem technology can solve with ease. Indeed the UK government is keen on federal schools and network learning communities (sharing admin.) but this does not seem to have generated the effective tiny schools that we believe are viable. We are so interested in this potential for a distributed school that Ultralab has submitted a proposal to "assemble" a distributed school from a number of potential learning spaces and groups of children all too small to be viable on their own.

The strongest design link in terms of scale is with head teacher income! Given the pivotal position of head teachers in the design process this rather skews the model towards large and indeed larger schools. Since new schools attract students (parents like them, regardless of design) this produces an inevitability about size. This does not mean that size per se is desirable.

The short summary of this driver in design terms is this:

the system is skewed towards large schools, it shouldn't be

lately, we have not properly explored very small, or indeed very large, or all-age schools; we should

economies of scale are not now linked to geographical proximity - designing for the distributed school is a significant challenge

- **Political**

Education is not currently a "political football" in the way that it has occasionally been historically. There is a cross party consensus that improvement is necessary, that pedagogy is changing, that school buildings and ICT capability are vital and that provision is needed in capital and revenue terms to resource that change.

"A workforce with technological skills for the 21st Century is vital to Britain's success"

Charles Clarke, speech, 25th June 2003.

"The Government are supporting £657 million of investment in schools' information and communications technology (ICT) provision up to 2002 as part of the National Grid for Learning Initiative. This funding may be used to install new equipment and software and to replace or upgrade older infrastructure."

Michael Wills, Education questions, Hansard, 26th June 2002

"the time is right to approach capital investment in a new way to build schools of the future....

...we must ensure we have a standard of school that our young people deserve, inspirational well-designed schools to motivate teaching and learning, and up-to-date facilities to enable us to compete as a world-class economy in the 21st Century"

David Milliband, speech, 26th June 2003

and indeed modernising schools rather than modernising teaching or rejuvenating the curriculum has always been something of a vote winner and a popular manifesto commitment:

"Already, up and down the country, hundreds of new modern schools are showing the shape of things to come. Our programme will open up the opportunities that they provide for further education and better careers to every boy and girl; and by 1965 we expect that at least 40 per cent will be staying on after fifteen"

Conservative party manifesto, 1959

"The building of new schools and the modernising of existing ones will be pressed ahead. The rising school population will put heavy

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pressure on our resources, but we are determined to devote a share of each year's programme to improving conditions in the older primary schools."

In practice this is obviously a welcome political commitment, but it is problematic. Tangible investments like new schools, modern schools, up-to-date facilities, schools of the future, are all easily understood by the electorate, more so than curriculum reform, more targeted CPD, or new forms of assessment. Unfortunately, a central tenet of this work has been the clear understanding emerging from the research that moving the design of schools forward cannot happen in a vacuum any more than pedagogy can be changed on its own or the administrative infrastructure. The sight of a new school might be electorally desirable, but without the radical changes that are needed to accompany it those new schools will be "yesterday's schools" rather than tomorrow's. It would be like moving a three legged stool forward one leg at a time.

In short political commitment is needed to progress a programme of new school building, but political bravery is needed to progress the necessary accompanying changes too and that is harder for politicians to offer, with some honourable exceptions.

It is, bluntly, as hard for politicians to justify high levels of expenditure on schools without clear evidence of substantial gains in learning outcomes as it is for architects to design better schools without the feedback of better data on the learning that results from their designs.

The short summary of this driver in design terms is this:

> **political commitment to a building programme is relatively easy to understand for the electorate, on the other hand the other changes that need to accompany it are less simple to convey as important - this makes it a promise that is easy to make but hard to sustain;**

> **it doesn't help that we don't know, or haven't expressed well, what learning is and what better learning looks like.**

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- **Pedagogic**

Arguably, the post war baby boom defined a generation of school organisation and design, as systems and structures struggled to cope with a huge growth in numbers. After a long period of stability in educational organisation and pedagogy we have seen some dramatic new directions are emerging, for example Discovery 1 in Christchurch. The boldest schools are questioning all assumptions about organisation and management; some electrifying new approaches to learning are emerging as a result. The single age class is being challenged by all through mixed age teaching, as evidenced by schools like Chafford Hundred. The artificial subject boundaries are being pushed by cross curriculum study, the relationship between learning within school and out is being challenged (this will only increase with the significant UK investment that is "Curriculum Online"), as children spend increasing parts of their day learning in the community or, in one case, in the "host" university.

The number of adults in the classroom is changing: classroom assistants, adults other than teachers, student teachers, older children (perhaps from another education phase), parent helpers, inspectors, advisers. Classrooms are no longer one-teacher, one-group spaces and yet designing for this (for example with multiple foci) is not well understood. Much of the professions rejection of open plan schools in the last century was triggered by the threat to a teacher's "privacy" in "their" classroom and by noise issues, but although that privacy has long since been breached by team teaching, inspection, initial teacher education, assistants and even parents, and the noise level in a multimedia classroom is already higher, open plan has not been properly placed back into a portfolio of design opportunities.

Pedagogic trends do tend to come and go; currently whole class teaching is firmly back as desirable component in a variety of teaching techniques, but in some areas of many schools, particularly ICT rich rooms, whole class teaching is simply precluded by previous design decisions. We visited one school where a new science block had no network connections in most rooms, but where a cramped ICT suite with many network points had no focal point, no display or board area and where, in both cases, current pedagogic trends could simply not be countenanced having been excluded by very recent, poor, design decisions.

The length of the school day is changing with a mixture of curriculum need, curriculum crowding, parent employment, single parent families and much else moving schools toward pre-school and after school formal activity. This kind of

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'longer day school' has very different design needs to a traditional 9 to 3 school (for example a need for better washroom facilities and café facilities with lower marginal costs of use).

But these changes are highly complex and frighteningly interdependent: one school where the subject structure had been abandoned found it hard to recruit junior staff (without a subject structure applicants couldn't see career path leading them towards "head of department"); another school produced a learning environment so exciting that it became a target of local militants fearing for radical changes to the conditions of service.

Children we surveyed saw the need for more open spaces for "doing things" and these type of spaces were apparent in any designs that these school students offered. They are acutely aware of the increasing need for built in flexibility. However one of the issues that was reported time and again was the conservatism of the teaching profession. This is almost certainly not innate; teachers are imaginative and creative professionals, but perhaps as the result of substantial pressure to improve standards and associated regulatory framework of quality control rather than quality assurance, teachers reported feeling "imprisoned" and constrained. This is not the ideal situation from which to develop innovative schools that deliver on the creativity needs of tomorrow's economy. Moving the profession from a regime of quality control to a reflective philosophy of quality assurance, through a habit of action research and of reporting, may take so long that the building stock is complete just as the profession is finally empowered to take learning forward. A nightmare scenario is that the profession starts to move forward, but finds that the new stock designed by the "old" profession becomes its major impediment. Government needs strategies to avoid this disaster.

Many head teachers commented that newly qualified teachers had gone through a system of tests and national curriculum, and learnt to teach using a framework of testing and monitoring. In this climate, they suggested, it was sometimes difficult for those head teachers who wished to innovate with the organisation of learning in their institution to effect change. Teachers are, arguably, not well prepared as action researchers, to evaluate an evolving pedagogy.

The short summary of this driver in design terms is this:

pedagogy is changing in a complex way; all architects need to understand how, why and in what direction

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performance measures may drive the specification of schools to deliver in terms of current, not future, pedagogy;

...but children will work a longer day, be more flexible and collaborative in school, mix both ages and subject focus, work with multiple adults in their classrooms and embrace learning in the community more. This does not rest easily in the designs of today's schools.

- ### Design life

Almost without exception school design assumes a residual value measured in scores of years, with a build quality to match. This creates the tough challenge of designing a school that will deliver appropriate teaching and learning for, say 2050 or beyond and a clear driver is the assumption of longevity; it permeates the allocation of capital rather than revenue to school design, it makes planners over cautious about what will be acceptable to future generations and it limits experimentation. A key driver of the current funding model has been this assumption of longevity. Obviously, most schools have a long design life and we don't see that changing, but there is clearly a case for building some with much shorter design lives and using them to explore, in a way constrained only by the fact that real children living real lives will still need to be educated within them, new designs for new pedagogies.

We have observed an interesting experiment where a school is "assembled" briefly for a very few years using the design values of retail space with a philosophy of constant renewal and repurposing of space, moving from leasehold to leasehold and, by adding value to the overall site through this community focussed occupancy, getting favourable leasehold conditions.

We didn't observe such an experiment in the UK; we think we should have although there is much other commendable design exploration in the UK not necessarily constrained by longevity, notably the DfES Classrooms of Tomorrow work.

Technological design life is not treated well either. It is clear that electronic whiteboards are very effective at moving the technologically under confident forwards professionally. But is is also clear that the countries which moved first into electronic whiteboards are finding that teachers quickly move on to want "plumbed in" projectors that can quickly display a full laptop, either the teacher's or children's. Schools are being designed around today's needs for electronic whiteboards but not around the certain needs of tomorrow's confident, flexible, laptop projecting teachers. They should be.

The short summary of this driver in design terms is this:

assumptions of longevity can be a significant brake on innovation in buildings;

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false assumptions of longevity in pedagogy or technology will leave us with the "wrong" buildings in the future;

architects need a much clearer view of the dynamic of schools and of learning and the of the gradient of change over time.

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