Chapter 2
Unpacking classrooms

It is hard for Tau to observe the material contents inside a school from an aerial view. To get it right you would have to take all the school’s material artefacts outside and place them on the field. We could then observe what each school contained. Desks, chairs, curtains, overhead projectors, books of various kinds, smart boards, computers and other technical equipment, posters, models, and musical and sports equipment could all be laid out. Telling differences would quickly emerge between schools, much as Peter Menzel found when he went around the world photographing the possessions that different homes contained (Menzel, Mann and Kennedy, 1994). To get all the possessions of an American family in range he had to hoist the family up on a cherry picker and put all their possessions in the background. Even so, the photograph left out many of their possessions. Contrast this with a rural village in Uttar Pradesh, India, where the full set of belongings of the Yadev family (including food, cooking equipment and furniture) came to less than 20 items.

Menzel produced another book about what families across the world eat. He asked families to place in front of them all the food consumed in a week. The photographs are tragic to contemplate. A family in Chad smile at the camera with only the barest necessities placed in front of them (Menzel and D’Aluisio, 2007, p. 56) while a German family have stacked to overabundance in front of them beer and bratwurst along with healthy doses of fruit, vegetables and bread (Menzel and D’Aluisio, 2007, p. 133).
The North-South, urban-rural divide is a tangible one: you can touch its pain and taste its excess. It is from these different kinds of home that children go to school. The German and American families had lots of books in their possession, whereas the Indian and Chad families had none, except for a single religious text. Tobler’s first law of geography, ‘Everything is related to everything else, but near things are more related than distant things’ (Tobler, 1970, p. 236), would lead us to predict that something similar would happen if we had to display all the furniture and equipment of schools close to these families: massive piles of equipment on the school fields of Germany and the USA; and just some desks and chairs in rural India and Chad.

What would we notice if we unpacked the different rooms of a school into separate piles on the field rather than one pile in the middle? Would we be able to see what the different rooms do based on what they contain? A library and computer room would quickly reveal their function, as would most audio-visual rooms. Art rooms and science laboratories would also quickly reveal themselves, as would the medical centre, staffroom and hall; sports, domestic science and technical centres; and possibly even the furniture of the principal and deputy principal’s offices and reception. But as we floated above the fields from urban to rural and from North to South it would also become painfully apparent that some schools have only the basics and that all their different rooms seem to contain much the same stuff; desks and chairs in the main, often maimed or broken. Specialisation of function would be hard to determine from classrooms’ material contents.

This would become even more painfully apparent if we had to unpack the contents of the most privileged private schools. This was brought strongly home to me recently when I visited one of these schools to talk to the teachers about what distinguishes an excellent teacher from a good one. As I walked down the tarred internal road, there were signs pointing off either side to buildings, each holding a specialist function – sanatorium, museum, chapel, theatre – mostly prefixed with the name of some illustrious retired headmaster or former student turned benefactor. The administration block was a two-storey building, as large as some schools, all on its own.

Note what we are doing in terms of the educational imagination. Instead of moving spatially outwards to more and more schools and the expanding spatial logics this wide-angled focus gave us, we are now focusing on the school itself and how it works, with its classrooms, desks, chairs and pedagogic equipment giving us increasingly smaller levels inside the material reality of a school on which to concentrate.
One classroom and one teacher per school: the Lancasterian way

If we went back to the early 1800s we would find plenty of debate around what a school should actually look like. Western industrialising countries had not settled on what a school should be; or on what classrooms, desks, chairs, and writing and teaching equipment should be. Take the blackboard we find in many classrooms around the world. When blackboards first arrived at schools they had to be argued for. Many teachers resisted them, found them impossible to understand and use and could not see the use for them. Blackboards were not obvious pieces of equipment and it took a long time for their use to become entrenched. There is a wonderful little manual produced in 1841 entitled *The Black Board in the Primary School*. It contains a homily to ‘the very simple and incomparably valuable, though much neglected appendage of the schoolroom, the black board’ (p. vii). The writer of the homily bemoans its lack of use to a clergyman on one of the school committees and this is the response he got: ‘No,’ he replied, ‘it is of no use to get them. If we had black boards, we have no teachers that can use them to advantage’ (p. vii).

I can resonate with the sentiment, not with blackboards but with our own modernised version – smart whiteboards. We acquired one for our university’s school of education. It literally sat around like a white elephant, and was eventually used simply and tragically as a board to write on; tragically because the red marker used was of the cursed permanent ink variety.

Back in early nineteenth-century England it was not even clear that there should be classrooms in a school. Here is what a typical Lancasterian school (figure 2.1) looked like at the beginning of the 1800s (Lancaster, 1810). There are no classrooms, only a schoolroom for all the children, no matter what their age. The dots represent school children sitting in long benches, divided into 8 ‘grades’.

Figure 2.1 Lancasterian school plan
If you packed everything outside you would have twenty long desks and benches, a teacher’s desk and chair, slate tablets and slate pens for each boy and a lesson board for each row. There would also be printed arithmetic books; paper, pens and inkstands for the older boys; and sand desks, plus an alphabet wheel, for the youngest to practise finger writing. There would also be badges of merit and disgrace marks made of wood to be hung round the necks of children, pointing sticks for monitors, a bell, a whistle, a clock and some books for a library (British and Foreign School Society, 1816, pp. 5–11). That’s it for a whole school of around three hundred boys. How did they do it?

All the boys were housed in one schoolroom (figure 2.2a). Different ability groups were divided up into rows with long benches and tables for each group to sit and work. Once you learnt the curriculum for your row, you could move back a row (even if the others in your row had not matched your performance) until you reached the back row and then possibly graduated to being one of the pupil monitors on the side, assisting a particular row of boys. Boards were hung on the side walls to allow the monitors to teach and question with the boys allowed to gather round their own particular board in a semi-circle (2.2b).

The teacher presided over proceedings from a raised platform at the front of the room. Around three hundred boys at different levels could be taught in one room at the same time (Burke and Grosvenor, 2008, p. 39). At the front of Lancaster’s book – *The British System of Education* – where Lancaster outlines how the whole system works, is figure 2.3.
Lancaster explained the frontispiece to the book as follows:

The monitor is represented standing with a pointing stick in his hand, to enable him to point out the best performance, without touching the writing on the slate, which might accidentally obliterate the writing.

The boys are represented as sitting in the first desk in a class, in common with which they are exhibiting their slates, at the command from the monitor.
“SHOW SLATES!”

They are represented as having written not merely a word, but a sentence; and a sentence that every true Briton will wish to be engraven, not only on the memory, but on the hearts of the rising generation, as a tribute of duty to the monarch, who reigns in the affections of his people —“LONG LIVE THE KING!”

Slate tablets were cheap, fairly easy to maintain and could be wiped (Hall, 2003). The materiality of slate enabled and afforded a particular type of pedagogy. First, it was cheap, so it enabled the spread of mass schooling. Second, it enabled visibility as all the boys would have to display what they had written to the teacher or monitor. This forced attentiveness as any mistake or lag was quickly picked up (Hall, 2003). Third, it afforded repetition and practice as each response could be quickly wiped off to enable a new one. Fourth, it allowed for simultaneous teaching and learning. As the teacher spoke, so the boys would write, reinforcing what was heard with physical action. Fifth, it enabled continual activity by all the boys at the same time without wasting materials. Finally, it afforded continual movement of the boys up and down the rows depending on the correctness of their responses, enabling a competitive meritocracy to motivate performance and attention. Paper and quill pens were expensive and difficult to procure. Continual maintenance of the pens was needed and much ink was spilt, literally. This resulted in the increased use of slate tablets and slate pens during the nineteenth century until mass production of pens and paper took over.

Military precision was needed to keep all the boys learning at the same time. Here are the duties of the monitor-general when using slates for dictation:

Duties of the monitor-general before dictating begins

4th. When the children are seated, he gives the command in a quick, distinct, and audible tone of voice – *Unsling slates*. The children catch the string belonging to the slate with their left hand and with the right they hold the slate and place it on the desk.

5th. The next command is *Clean slates*.

6th. After the slates are sufficiently cleaned, the monitor-general gives a signal to leave off by ringing a bell. The pupils then place their hands on their knees.

7th. He then orders them to *Show slates*. The boys cross their arms, and taking the upper corners of the slates, raise and turn them in such a manner that the clean side is seen by the monitor-general.

8th. His next command is *Monitors, Inspect*. The monitors leave their places and examine the slates of their pupils to be certain that they have cleaned them well. They then return to their places, and turn the telegraph to show the general-monitor that the inspection is finished.
9th. His next command is *Lay down slates* after which he rings the bell as a signal on which the boys put down their hands.

10th. He then directs the Monitors to *begin*. The monitor of the eighth class dictates a word; then the monitors of the 7th, 6th, 5th, 4th, 3rd, and 2d, in succession (British and Foreign School Society, 1816, p. 49).

This sets up a continual cycle of writing, showing and cleaning.

Compare this to the modern slate currently making its way into schools, the iPad and its various (cheaper) tablet rivals (figures 2.4 and 2.5).

![Figures 2.4 and 2.5 Old and new slates](image)

The development of technology when contrasted like this over two hundred years is genuinely astonishing, but we do have to be careful. The Apple iPad is very expensive, needs to be continually charged and has to be carefully looked after as damage is often fatal. It freezes, crashes, needs continual updating, is prone to attacks and viruses, and can be used as a portal to worlds into which young learners simply should not go. At present it does not afford the same possibilities for mass education as a slate tablet. The iPad is not as robust, easy to use, tangible, cheap or safe as slate. These are crucial considerations when thinking about mass schooling. It is also the case, however, that modern technology (here I am thinking specifically about mobiles – smartphones and tablets – that have cameras, GPS, web 2 capabilities and apps galore) contains within it the dissolution of modern
mass schooling as we currently picture it.

It is hard to see at present because there is both hysterical hype from tech evangelists about the revolutionary potential of new technology and a failure to understand that education is about far more than technology. That said, something about Marshal McLuhan’s aphorism ‘the medium is the message’ rings true about mobiles. Not only can all textbooks for all years be downloaded and continually updated on a tablet, condensing the school satchel that I lugged around into one small device, but it can also hold all the writing books, tests, homework, projects done over the years, and keep track of them. It can serve as a school notebook, art book, calculator, GPS, maths tutor and video player – the list goes on and on. The teacher can keep track of every single student on hir (his or her) own device.

But this is still keeping within the traditional school paradigm. The mobile enables continual real time interaction with anyone who is also connected, anywhere and at any time, fundamentally breaking the materiality of classroom walls. It spins knowledge out of the control of the official curriculum with a little expectant blank box and search button. YouTube contains brilliant lessons on every conceivable subject, often performed more successfully than by actual teachers in actual classrooms. More than this, it is now malleable, with students able to take it and manipulate it into forms they prefer, share it with whom they like, and develop reference groups that spin way beyond their teachers and class peer group. It condenses time and space into one gadget, breaking away from the necessity to have a specific place for schooling at specific times with a specific age group. I can imagine defenders of slate tablets getting a little tetchy at this point and pointing out that slate tablets can also be multifunctional: ‘What about the slate tablet combined with calculator that has been around for hundreds of years and doesn’t ever need to be charged?’ they might say. And they would be right: there is such an object (figure 2.6) and it is a beauty to behold.

![Figure 2.6 Abacus and slate](image-url)
Boundaries of the Educational Imagination

A school with classrooms and teachers

But we have moved very quickly from the materiality of early mass schooling in England to its future dissolution. What of the two hundred years in between? What makes the Lancasterian set up so strange for us is the absence of different classrooms for different age grades. Most of us experienced school in the physical space of a classroom where we were divided up and separated off in age bundles. This was by no means the obvious way to organise schooling in nineteenth-century England. When the English architect Robson undertook a grand tour in search of the best schools in Europe and America in the 1870s, what impressed him was the Prussian school system. He notes with both excitement and surprise that ‘The system in use among the whole German speaking race … turns on the theory that each class should be taught in a separate room by a separate and fully-qualified master’ (Robson, 1874, p. 12).

Imagine that! All the discussion in English education about whether the schoolroom should be wider or narrower to accommodate all students, or about how to work with pupil-teacher monitors, is absent from German debates because they don’t have one large schoolroom, they have classrooms in a school, and they don’t have children teaching other children, but qualified adults teaching them. What an idea. Is it not obvious that you need pupil-teachers, given that adult teachers are expensive, and that you need to work in a large hall with small groups that are continually checked and monitored, rather than small classrooms with only one teacher struggling to keep control? What could be wrong with a plan that shows how one master without any other teachers ‘might conduct a school of 1 000 children with perfect ease; and that while their progress in learning was much more rapid than in the old method, the expense for each child need not, in a large school, exceed 5s. or 6s. per annum’ (British and Foreign School Society, 1816, p. iii). Don’t laugh, though. Our current debates about the size of classrooms and pupil teacher ratios will look equally strange by the turn of the twenty-first century.11

Robson was enormously impressed by the German classroom and the manner in which it had been developed, given its one-hundred-year head start on England over mass schooling. It was the Prussians, not the English, who embarked on mass compulsory schooling in 1763.12 It had become clear to school architects in Germany that classrooms as a rule should not exceed a length of 30 feet and a width of 21 feet, with a height of no less than 13 feet. The reasons for these particular dimensions are fascinating. First, the Germans insisted on all the windows being to the left of the children, ensuring that the right hand did not cast a shadow whilst writing (Robson, 1874, p. 84). There was no electricity, so in effect the width of the room was determined by the amount of light reaching the desk furthest from the window along with an extra three or four feet for a
This meant that the width of the room could not be more than one and a half times the height of the room (Robson, 1874, p. 85). The length of a classroom was determined in part by how far students could read writing on the blackboard and by how far a teacher’s voice could reach without straining, both estimated by experience to a maximum of around 30 feet. Furthermore, the breadth of a classroom should not be more than 21 feet ‘because then pillars or complicated construction are required’ (p. 84). Each child should be apportioned three square feet, anything less being unhygienic with a maximum of sixty children per class. The size and shape of the classroom was not arbitrary in any way. Its spatiality was not at the whim of the architect or school planner. The materiality of the classroom in its own particular functioning asked for a certain length, width and height. As Robson notes after lovingly describing a number of German gymnasiums, ‘the old idea, now forever exploded, was that any kind of building would do for a school, and that the shape of a barn was as good as any (p. 117). Ditto for the classroom.

Light and air – in search of the elements

The fascination with light in classrooms was not a peculiarly German preoccupation. There are grounds for claiming that it has been the central visionary organising device of classrooms since the project of mass schooling spread in Europe more than two hundred years ago. The School on the Sound, Copenhagen (1937), for example, attempted to maximise natural light, fresh air and closeness to outside surroundings by creating massive window/doors that open out to allow inflows from the outside (Burke and Grosvenor, 2008, p. 81). The walls could be folded back, creating a feeling of being in the open air whilst still being protected from the elements. Children with exposure to the elements would be healthier children, tougher children, fitter than the rest children; able to survive war and hardship, able to be hardy citizens and, if the time came, hardy soldiers. Public health, hygiene and racial superiority pushed the desire for light and air to the extremes of open-air schooling. The French League for Open-Air Education argued that exposure to the elements would contribute to the

[r]estoration of the French race, fight against tuberculosis, alcoholism and the causes of degeneracy. Raise strong and vigorous generations. Train well developed, active determined young men and women; men who love their country, are ready to serve and defend it … women who will conscientiously support their husbands, housewives who are attached to their home and prepared for their asocial role (Burke and Grosvenor, 2008, p. 82).

These visionary attempts to provide more and more light inside the classroom
fell foul of their own absurdity, impracticality and expense, and the continued endurance and replication of the older stock of schools with their rectangular classrooms built from brick and mortar.

Virtual classrooms

Some classrooms do not have to exist in brick and mortar form – they have mushroomed in virtual reality as well. Virtual worlds such as Second Life make it possible to create interactive, computer-simulated environments in which students can learn. These simulations create a virtual classroom space that mimics a real classroom with chairs and desks and student avatars sitting in place and responding to the teacher. These classrooms can be used to train teachers, just as we use virtual machines to train pilots and truck drivers. For an example of a virtual classroom see the one created for pre-service teachers at the University of New England (UNE).

You enter the classroom with an avatar that can walk, speak and interact, and you have control over what your avatar looks like. Sue Gregory and Yvonne Masters, two of the lecturers on the virtual reality course at UNE, have their own avatars respectively called Jass Easterman and Tamsyn Lexenstar, and as a teacher you can choose who you would like to be and what you look like. Students enter this virtual world and engage with the avatar lecturers, other students, the environment and the task. As useful, immersive and engaging as this second world is, most students still prefer real, live interaction with actual people. But the problem with real live interaction is that it is expensive, happens only in one time and one place, and must be repeated year after year; whereas Second Life is cheap, and can happen across time and space.

Simulated worlds are shifting quickly from a gaming environment across to education, real world activities, and back to gaming. Driving simulators, for example, are used to train truck, train and bus drivers. It is much safer to simulate a crash situation for a driver to respond to and experience the consequences of his decisions, rather than have the actual crash. As simulation improves to the point where the participant feels like she is really in a moving vehicle, it has produced all sorts of unexpected results, one of which is simulator adaption syndrome (SAS). A simulator can make you feel as if you are in a real situation, but there are enough differences to cause driver discomfort. Simulators often react to driver responses in ways slightly more delayed than real time, resulting in many drivers developing motion sickness, headaches or disorientation.

This can carry over back into the real world, where the real car you are driving suddenly feels very strange after a couple of hours of simulated driving experience. A friend of mine almost wrote off his car when driving home after playing a racing car simulation game (Grand Turismo) at my house late into the night. It is an immersive game with a steering wheel, gears, brakes and accelerator
that gives you physical feedback (the steering wheel shakes and resists). Different cars can be chosen and racing specifications can be altered, resulting in distinct effects actively experienced in the drive. On his way back home he took a corner too fast and almost wrote off his Golf. It did not handle in quite the same way as the virtual Ferrari he had been driving for a couple of hours. What is astonishing about the effect is that it did not cost the $15 million dollars it took Toyota to develop an immersive driving simulator; it cost under five thousand rand and can be found in middle-class teenager rooms across the world.

Although classroom simulations have not reached this level of virtual realism, there are increasingly sophisticated attempts to virtualise classrooms as we saw with the Second Life example. The most sophisticated current attempt at a virtual classroom that I know about is simSCHOOL, started up by David Gibson. It is a classroom simulation that has a number of artificial students, all of whom have different characteristics, needs and learning styles. As you teach the class, student responses shift and change and you have to work out what responses work best for individual students and the class as a whole. At any stage you can check how your individual students are doing and at the end of the lesson a detailed report is given of the effects of your decisions. You can go back and try again to improve your performance and learn through the process different instructional strategies, classroom management techniques and relationship building with students. You can also design your own classroom with your own unique students and your own lesson, and share it with other teachers and teacher educators across the world, building a dynamic online community all engaged in improving teacher education. But even this kind of virtual classroom does not get close to what is going down in medical education.

In medical education there has been a long history of using simulation, now reaching the point where students practise medical procedures on plastic, real-life, computer-linked models that respond according to the student’s actions and provide invaluable practice and feedback in skills such as suturing, anaesthesiology and minimally invasive surgery. An intern learns to respond to a crisis during the birth of a baby, not on a real live baby but on a baby mannequin set up in a true-to-life situation. This has resulted in specialised medical simulation centres that set up hospital environments, often to high levels of fidelity, with mannequins that have human-like tissue density and can do things such as adjust bleeding, pulse and blood pressure levels.

The United States army also has simulation centres, only these work with scenes of battle. A medic has to work quickly and efficiently under enormous pressure with a range of injured mannequins as smoke, bullets and explosions reverberate, making decisions and performing actions depending on the state of the mannequin. All of this is recorded on computers, enabling analysis of and feedback on the medic’s performance.
Moodle and MiRTLE

As the demand for education increases, and distance education becomes increasingly popular as a way to address this need, the combination of virtual and actual classrooms becomes attractive. Universities and schools across the world have embraced eLearning as a crucial dimension of teaching and learning. Learning management platforms like Moodle and Blackboard are not as spectacular as simulation machines, but they provide tangible benefits to students. Moodle, for example, at the end of 2014 had over 66 million users and over 7 million courses. It allows a lecturer or teacher to set up online websites for students enabling all sorts of information, documents, assignments, quizzes and discussion groups. Students can submit their assignments and receive feedback online, discuss issues with other students and the lecturer, and download all the documents and files related to the course. Lessons are still face to face, but many of the other activities surrounding teaching and learning are enabled in a virtual world.

This combination of students being taught in real physical classrooms while also engaging in virtual space has increasingly resulted in the blending of different realities. It has now become possible to include distance students in a real time lecture, not just by allowing them to watch the lecture from a remote location, but by having them present in the actual lecture. This is called a mixed reality teaching and learning environment (MiRTLE).

In the physical classroom lecturers will be able to deliver a lecture in their existing manner but they will have the addition of a large display screen mounted at the back of the room that shows avatars of the remote students who are logged into the virtual counterpart of the classroom. Thus the lecturer will be able to see and interact with a mix of students who are present in the real world or the virtual world whilst delivering the lecture. Audio communication between the lecturer and the remote students logged in to the virtual world is made possible via a voice bridge. An additional item of equipment located in the physical world is a camera placed on the rear wall of the room to provide a live audio and video stream of the lecture to the virtual world.

From the remote students’ perspective, they log into the MiRTLE virtual world and enter the classroom where the lecture is taking place. Here they see a live video of the lecture as well as any slides that are being presented, or an application that the lecturer is using. Spatial audio is employed to enhance their experience such that it is closer to the real world. They have the opportunity to ask questions just as they would in the physical world via audio communication. Additionally a text-messaging window is provided that allows written questions or discussion to take place (Horan, Gardner and Scott, 2009, p. 5).
The dimensions of a classroom worked out in Germany over two centuries ago are beginning to shift, as is the very idea that classrooms form the spatial unit of teaching and learning.

No classroom classrooms

Whether actual or virtual, the idea of a classroom has established itself firmly as a basic organising unit for education. To see how firmly, take a look at the following story taken from rural KwaZulu-Natal and told by Costas Criticos:

The school, which is bursting at the seams, always has one class which finds itself without a classroom. These classes have to go out to the dusty playing field for their lessons. You might expect … that the teacher and class would seek out one of the few shady trees as a refuge from the harsh sunlight. Instead of this, the class filed out to an area in the middle of the playground where the floor plan of a classroom had been neatly marked out with stones. The ‘classroom’ even had a break in the wall for a doorway. The children stood along the wall of their ‘classroom’, while the teacher who was standing at the ‘doorway’ waited patiently for them to get into a straight line before she gave the command to ‘go in’. The class didn’t walk through the virtual concrete block wall, but instead, turned deftly in through the doorway and made their way to their neatly arranged rows of ‘virtual desks’ (Criticos, undated, 4.1−4.2).

Criticos was stunned by what he witnessed and muses over what he saw: ‘What is so attractive about the classroom and the rituals played out in these spaces that teachers and pupils are conditioned to regard them as normal? Why does the classroom become the organising unit on which development proposals are based?’ (4.2).

He concludes that the ‘traditional teacher-centred classroom as the basic unit of currency in education is overvalued and in need of examination’ (Criticos, undated, 4.2). It’s not so clear to me that this is a failure of the educational imagination. Teachers understand the need for ritual as the core musculature that holds a school together. To shift away from a classroom-based model would result in all sorts of disruptions to the way things are normally done, and these disruptions would foreground themselves rather than allowing the lesson to emerge in its own right. It’s not easy to create a space of taken-for-granted actions and habits that allows a zone of concentration to open out from its tacit ground. The best way to do this is to keep as much as possible of this world in place, precisely to allow for the space of the imagination to unfold. The virtual classroom in the middle of the playground with its imaginary desks and chairs is a double victory for the educational imagination: first because it holds the rituals
of classroom life in a hostile space; and second because this provides students the tacitly-given rituals they need to engage with new knowledge.

The furniture of teaching and learning

Concern over getting the ergonomics of school furniture correct is not a peculiarly recent phenomenon: it has been with us from the beginning of mass schooling. As Robson travelled around the Western world chronicling the materiality of its school architecture, he also provided a detailed account of how different countries were responding to the need for desks and chairs that worked pedagogically, but were also cheap and simple to manufacture. In his simple, direct, but deeply insightful way he notes:

It is yet a feature seldom thought of at the outset, and not until the building is finished and ready to receive the furniture, is it found how much more suitably the schoolhouse might have been planned had the desk question been first decided. Too frequently the complaint is similar to those so commonly heard against the houses run up by speculative builders, in which the bedroom has no proper place for the bed (Robson, 1874, p.168).

Speculative builders have not changed their habits. Is it possible to say the same of our children and how they sit and learn at school? Granted, children have become larger in the last 150 years with longer arms and legs resulting in a current re-evaluation of the dimensions of school chairs and desks, but has anything substantially changed in the material design of what children sit and write on for around thirteen thousand hours of their lives?

The first difference quickly jumps out. A major design issue of school chairs and desks in the nineteenth century was the need to ensure comfort ‘not for sitting at or for standing – but for both’ (Robson, 1874, p. 169). The choice for our modern children is whether to sit or lounge, not sit or stand. Apart from this, school furniture designers struggled with a multiplicity of issues. Should there be long benches and tables, or tables and chairs for two children, or just for one child; should the table and chair be designed as one unit, or separately; should it be fixed to the ground or not; and should the desk have a flap for storage, be foldable for stacking and cleaning, adjustable for different demands? As always, there were designers who were enamoured with designing the best possible desk and chair that could do everything for everyone, but never made it in the mass schooling market where cheapness and simplicity are prime movers.

For example, Herman (2011) tells the story of early twentieth-century attempts at designing a ‘modern’ school desk combination in Belgium where almost every single joint was adjustable to enable children to find their own sweet spots. These were simply too expensive to mass produce and too finicky for mass everyday
robust use, and were abandoned for simpler, cheaper, robust models. The twenty-first century is no different, with a continual stream of sophisticated and adjustable school chair/desk combinations falling foul to the twin requirements of affordability and durability.

There are, however, some key differences between the sophisticated early twentieth-century designs and current models. Ergonomic research has increasingly recognised the need for an open posture when sitting at a desk, meaning that your body is stretched outwards to a more upright position rather than hunching over the desk. The angle between torso and thighs is extended from less than 90 degrees to 135 degrees; the health benefits of which are research proved (Dennehy, 2009). Contrast this to what standard school furniture expects of posture: the hunched back effect. Schoolchildren tend to try to get their heads within 30 centimetres of their work and will sustain peculiar positions for long periods while writing and reading (Dennehy, 2009, p. 13). Why not start from scratch and design school furniture that takes into account what we currently know is best for posture and concentration? Why not increase the height of the chair to enable a more open posture and tilt the desk to prevent hunching, rather than force most of the body into a contorted form of dormancy that has given me my characteristic hunchback look. Why not encourage an active form of sitting that results in a strengthening of inner core muscles rather than a slow descent into weakness and fat? All I know is that whilst writing this my thighs are extended less than 90 degrees and I am hunched over the keyboard.

Keep it simple, stupid

The difficulty with these excellent designs is that they collide with the demand of mass schooling for simplicity and parsimony. When working with millions of desks and chairs, it is vital to keep both costs and the possibility of breakage down. Only when new designs are able to go to scale and are robust enough to withstand the attentions of a bored teenager, might they stand a chance of gaining a foothold in the world of school furniture.

Robson knew this many years ago. He reserved some of his most cutting remarks for school promoters and desk manufacturers who ‘render what ought to be one of the simplest articles of school furniture a species of harlequin, capable of assuming a new character at a moment’s notice. When too much is attempted, the result is never satisfactory’ (1874, p. 170). A harlequin is a comic character in plays dressed up in colourful clothes who never does a simple movement but always embellishes with a cartwheel or a flip. Now that’s an insult worth bringing back into our post-modern repertoire.

So what did non-harlequinny desks and chairs look like in the nineteenth century? One option was to combine the desk and chair, not only as you would imagine from the front, but from the back (figure 2.7; Robson, 1874, p. 367).
This arrangement worked for either double desks or longer benches. The problem with the above design is that the seats are not moveable, making it harder for the student to enter or stand and difficult to clean around. Moveable seats (figure 2.8) answered these problems.

This did not solve the issue of the visibility of the child to the teacher: ‘in grouping the class the object is to enable each child to see the teacher, and the teacher to command the face of each child’ (Robson, 1874, p. 75). This was especially a problem for students at the back, resulting in a strong focus on raising the height of the back rows, either through sleepers on the floor or increasing the height of the desks and chairs, or both. Take a look at the following two solutions (figure 2.9) and try to work out which solution is better.

Remember that it is always simplicity that carries the day when working with mass education. The top option is a simpler design than the bottom one, with only one step, not two, and all but the last row having the same size desks. Most teachers preferred an even simpler option, a flat floor, and this is what has prevailed in most classrooms around the world.

The dual desk system also brought with it specific drills for entering and leaving (figure 2.10). At the end of a lesson the teacher would issue the following six orders: ‘return’, ‘slates’, ‘lift’, ‘desks’, ‘stand’ and ‘out’ (Robson, 1874, p. 377–378).

The students would then be ordered ‘quick march’ and march off with left foot first. You don’t need Foucault to get the intimate connection between military discipline and schools.

So what did the twentieth century bring to the mix? Invented in the mid-1960s, the monobloc chair (as it is technically known) was in mass production in the 1980s, with a single press able to take two and a half kilograms of polypropylene and mould it into a chair in less than 70 seconds.18

Initially, just the seat and back were produced by injection moulding with the metal feet added manually, but by the 1980s designers had worked out how to vary the strength and thickness of various parts of the chair, enabling the far stronger but still light full plastic chair we use today (see Parsons, 2009, pp.
Figure 2.8 American double desks with seats attached

Figure 2.9 Section showing alternative method of grading desks in class

Figure 2.10 Classroom drill
100–102 for a brief history). Its virtues are that it is inexpensive, lightweight, washable, weather-proof, stackable, airy and comfortable. Its vice is that once it breaks it is only useful for landfills where it does not biodegrade and sits around with millions of other plastic chairs sharing the same fate whilst millions more pop out of presses every year. The plastic chair embodies the peculiarly modern quest to turn whatever possible into a fully automated industrial process (Sudjic and Brown, 1988). Combine this with a trapezoid table (figure 2.11) that can be laid out in various group work and individual arrangements and we have the stunningly beautiful classic combination of modern school furniture. How far we have come.

![Figure 2.11 Plastic chair and trapezoid table](image)

Take a breath for a moment, look back over the first two chapters and ask what the journey has been trying to do to your educational imaginations. We started with a single school as our focus and then rapidly expanded outwards and travelled through all sorts of space and time logics that come with taking all the schools of the world as our object, looking for tangible patterns and differences. We then turned around and instead of travelling outwards we went into the school to see what it was made of, again tracing how the internal working of the material dimensions of a school played out in time. The intent behind this whirlwind trip down imagination road was to get your educational mind-set to shift from its focus and attachment to the here and now and to begin to sense the massive, wonderful, yet tragic world education inhabits. Take a breath only for a moment though, for we have other educational worlds to travel through, intimated by scratched markings on the surface of a school desk, even a desk as spectacularly plain as the trapezoid one above. If it has been around for long
enough in a school, we would notice something transformative on its surface, something that revealed the force of living beings using its material reality on a daily basis.

For sitting on the chair, at a desk, in classrooms of all the schools in the world are human beings; and what curious creatures they are. So we jump from the collective materiality of schooling to the student sitting at a desk, with the view of exploring their individual material functioning (figure 2.12).

![Figure 2.12 Shifting from the material-collective to the material-individual](image)

*Figure 2.12 Shifting from the material/collective to the material/individual*