



Social Distance Timetabling

*Smart scheduling to reduce
infection risk*

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Chris is a co-founder of Edval, a company transforming education through smarter timetabling. He has experience consulting to government, and has achieved cost savings in staffing of £150k+ across several UK schools. Edval has global reach across several sectors, and provides advanced software compatible with SIMS, NovaT6, and over 70 other school administration systems globally. In addition to 'timetable audits' and timetable construction services, Edval also provides curriculum consulting.

About Edval

Edval is a global timetabling and educational consulting group. With offices in Australia and London, Edval has client schools all over the world, including USA, Ireland and Asia. In addition to the provision of smarter, algorithmic timetabling software, Edval has a large team of educational consultants who can assist schools to improve in many areas through the use of innovative technology.

It is unfortunate most schools miss one of the biggest levers to drive positive outcomes in almost all areas such as cost, academic performance, behaviour, staff retention and happiness, parental engagement and much more – the lever is timetabling. Timetabling is hard – it's a dark art. Edval is changing that, and would love to engage with your school.

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Social Distance Timetabling

Smart scheduling to reduce infection risk

Covid 19 has brought challenges to schools especially. Some countries closed them in the crisis, while others such as Australia, kept them open. Hard to know exactly what's best in such bizarre situations that have never been encountered before at this global scale.

One common message has been to limit social contact, in order to slow the virus propagation, allowing health authorities more time to cater to the ill, without overloading facilities and health staff. This is known as **social distancing**, to reduce the number of, and significance of any contact between people.

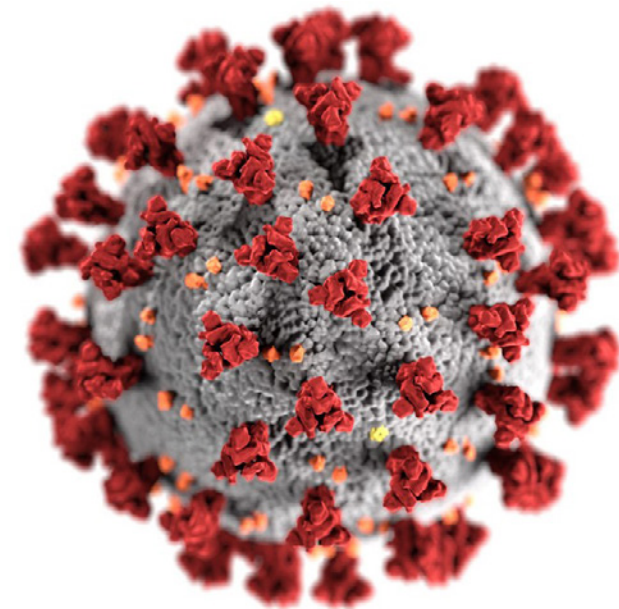
Schools have a lot of students and teachers, who all spend a lot of time in close proximity, which is a concern for virus storms like C19. Keeping schools open at these times allows many parents to continue working as health professionals, when they may be otherwise recalled home to mind children. It also removes contact between aging grandparents (more at risk) and children, if they are being minded by them instead, if their parents need to work. So if school does need to remain open, how can we mitigate the virus risk by smarter timetabling?

Surely there is no link between these completely unconnected areas? You may be surprised. There is a lot we can do with timetabling, to reduce risk and impact of virus transmission in schools. This could be of some interest even without an apocalyptic event like C19, as it may benefit reduction in more common cold transmission, and other more well known diseases.

The flip side to social distancing is social integration, which is also a common timetabling request. How do we integrate our Yr7 groups, so they are not 'always' in the same class for all subjects? How do we integrate Yr7 students with more senior students, such as vertical roll classes and group

sport? Schools have many reasons to adjust the balance between social distance vs. integration, and this may change at times, as world events, or just yearly seasons impact what is the *desired arrangement* in any timetable.

This is not medical advice, but rather its timetabling advice. If you want to know what you can do in your school, to reduce group sizes, and reduce opportunities for contact of disease, you may find the following strategies of some assistance in your overall plan. Much of this is not what would normally be considered in risk minimisation in schools, dealing with a health crisis.





Rooming

Rooming Consistency (Class)

The [World Health Organisation](#) states the C19 virus may remain for several hours or even days on surfaces. Regular cleaning of high contact surfaces is advised, but we can go one better. The timetabler sets the schedule, and can often improve rooming consistency - there are a number of techniques to do this in setting up requirements, and some clever tools that may need minor tweaking to deliver the outcome desired.

Consistent rooming for a class reduces the number of different students and teachers that are exposed to possibly infected

surfaces. The more we keep potentially infected students to the same rooms, we reduce the possibility of contact transference. It's similar to the advice to remain inside your home, we optimise the timetable to keep groups of students in the same rooms, as this reduces mixing of healthy students with potentially infected venues.

HomeGroupOf

Schools sometimes designate home rooms for certain groups. An example is that we designate R23 to be the home room of 7A, and R22 to be the home room of R23 for example.

Home room groups don't stop other classes from being placed in these rooms. It's not that the

home group 'locks out' the room, or needs to be there for e.g. Science lab lessons. However, for all subjects that are suitable, these home rooms are assigned almost all the time.

The benefit of this is increased rooming consistency across *different* subjects. So all students remain in place in this room far more, for theory subjects. Nothing to stop them being roomed elsewhere for practical subjects, or maybe even languages, if this needed specialist rooming for example.

The more we keep the same students in the same rooms, the more we reduce the possibility of cross infection, from both surfaces or from possibly infected students crossing each other as they transfer rooms.

Teacher Home rooms

Similar to 'Home Room Of', it is desirable to have teachers more in home rooms. This reduces the risk of infection from contact with surfaces. The more we can timetable everyone to remain more in the same places, we reduce infection risk.

While it may seem logical to hard code teachers to home rooms, there are some clever algorithms which can do a better job. Sometimes the less specific you are in scheduling home rooms, the more clever timetable software can optimise rooming to increase home room occupancy rates. It

can also allow situations where two part time teachers both share a home room for all, or most of their lessons.

This doesn't happen if the home rooms are fixed assigned, as often there are not enough rooms to be allocated to all staff who need them. Trust the algorithms to optimise this area, and seek assistance from timetable support consultants if things are not being allocated as desired. There can be a number of gotchas in this process, even though it can seem simple.

Algorithms which reduce teacher movement, means less contact with others, especially for those they don't already have contact with in classes. Keeping staff in home rooms more can be done with timetable tweaks. Often this area is a nice to have, and doesn't get as much focus for those who have spent some time working on the solution. Knowing there can be serious health issues however in times of pandemic's, we should pay more attention to this as a duty of care issue. Teachers like having more home room lessons anyway, and this can often be achieved with some focus and smart algorithms.

Student movement

A common concern is possibly infected students crossing paths with other, healthy students and causing cross infection. The more we can keep students in the same

room for more of the day, the better. We can achieve this by focus on student movement. Clever algorithms in advanced timetable software can optimise student movement. This means classes are scheduled to periods in ways that reduce the NEED for students to move as much, as well as this being done at the actual rooming stage. Once we begin rooming though, the damage is done.

So the smart approach is to have algorithms figure out Yr10 English should not go period 1 and Science period 2, as this causes the entire cohort to change buildings between periods. A better arrangement may be English period 1, and then Languages period 2 - if (for example) these were both roomed in the same building.

By algorithmic optimising of the period times lessons are

scheduled, we can then room in a manner that noticeably reduces student movement. Think of this approach as keeping students to at least the same *building* as much as the same room. The less students and teachers come into contact with others in the school who are not already in their class, the lower the risk of transmission of any disease.

Smart timetabling software has detailed reports that can show student movement in aggregate format. Edval has a Movement summary by period for students for example, showing the number of students moving between periods.

Teacher movement

Similar to student movement, we can use smart timetabling algorithms to optimise teacher movement. This keeps teachers to the same buildings more, and

Smart algorithms help reduce large class sizes to reduce infection risk



reduces the need for them to cross back and forth through the school, as they attend their lessons.

Similar to teacher home rooms, if we can't give them a consistent home room, we at least want them in a consistent area, and not passing by potentially infected students.

Edval software has a number of detailed reports for teachers, including movement across campus, movement by building areas, movement by period and so on. Understanding that you can review and analyse highly detailed and helpful information about movement is the first step to optimising it.

In wetter climates like the UK this is more critical as teachers don't want to get wet between buildings! But teachers generally prefer not to move if they don't need to. A health crisis provides a greater duty of care to encourage more isolation and reduce contact with others - ala social distancing. Who knew timetabling could do so much in this area!

Class size balancing

Smart algorithms can balance class sizes. The larger the size of a class, the more chance an infected student (or teacher) will infect many others. To reduce risk, we can reallocate to reduce the



overall size of large classes. This is quite relevant in light of the very high student absenteeism that occurs with a pandemic. It might be that some classes are more affected than others.

Rebalancing class sizes to possibly cater to significant, ongoing absences, will reduce the class to smaller groups overall. Government advice consistently advises to not have large groups attending events together, so any strategy that reduces class size is adhering in some way to this advice.

In addition, we can consider other strategies, such as class structure. Where before you may have had Maths and Science as separate classes, you may now want to

consider grouping these subjects together.

Collapse Classes

With larger than usual and long term student absences, it may be wise to collapse classes entirely. This is where you merge two classes of a subject together, and save a teacher and room. This delivers a significant saving, and may cater to ongoing staff absences too. Sometimes this is easily done manually, but smart algorithms can greatly assist in auto-generating collapse class arrangements. This can be A) Reassigning students across multiple subjects automatically to enable one class to now have no students needing it, or B) Reprocessing the elective

lines, moving classes which are taught in the same blocks, as a 'smarter' (but more complex) way to collapse classes – where you can't collapse them by just moving the students. Few schools realise the power of smart algorithms in collapsing classes, and this is certainly relevant if a long term pandemic has caused major changes in timetable needs.

Class structure

Being able to set the class lists for each subject separately, is helpful in many timetabling situations. It allows social balancing, gender balance, and can be used to set by ability. It gives full control to each department as to which students are in your class.

This model also means that there are frequently very different students in each class, all sitting with each other. To reduce this, we may want to consider mixing like minded subjects classes together. Where usually you may have all the English classes running as a block, and all History as a group – you may want to rethink this and merge the classes. This means the same 24 students doing English together also do History together. Another common example is Maths and Science. Students good at Maths are often also good at Science.

The more these classes stay together for more subjects, the less students are mixing with others. It's sort of like the advice to stay at home with your family. The class is

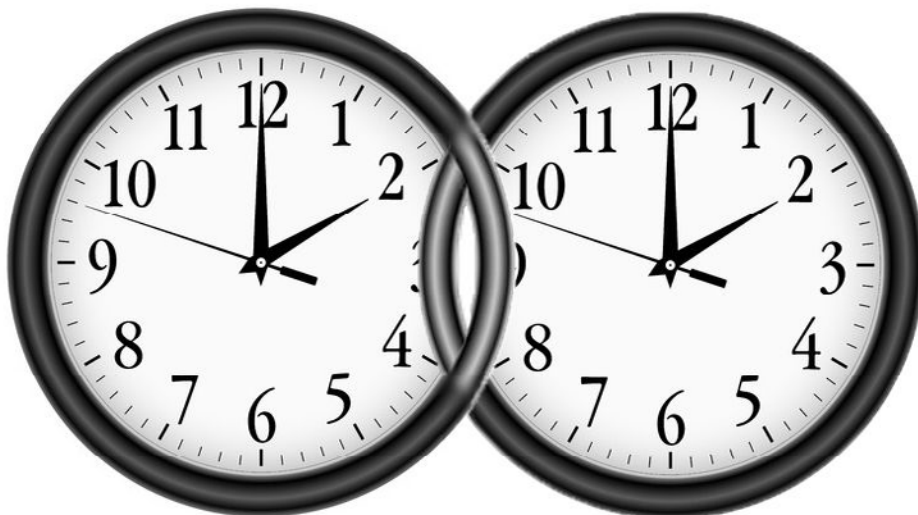
like a family, where we don't want them mixing with a lot of other families. Keeping them together more reduces the possibility for infection to be transmitted as quickly.

Double periods

Consider marking more subjects as needing double periods. Each subject that switches from a single to a double period means one less movement of students across the school site, and assists in rooming consistency.

You must balance the needs of teaching with that of social distancing. There is no right answer, but if there is not a big issue with some subjects going to double periods, the health aspects should certainly be considered to some extent.

Staggered teaching times increase student separation.



“Algorithms which reduce teacher movement, means less contact with others, especially for those they don't already have contact with in classes.”

Period shifting

Some schools start a period early for seniors, then for juniors, and finish the same in an offset manner. This provides access to specialist rooms like science labs. It also means break times may be shifted too. Having only half the school attend first period, and half last period means reduced social contact. Having only half the school in the playground at lunch is also reducing social contact.

This may mean more supervision required by staff on the duty roster, but for fewer students. As always, there is a balance between the needs of the school, of bus times and other factors – with the need

to socially distance in times of a global health crisis.

Smart timetabling software can manage scheduling with a concept of ‘*Period pairs to avoid*’, which can be set so staff are not able to be scheduled to both the first and last period of the day, if the day has a split shifted period grid. This means they don’t work a period longer than the employment legislation or policy may allow. Some schools already do this for efficient use of resources. Now you may want to consider this for the purpose of a significant improvement in student isolation – at least by large cohort groups.

The suggestion of staggered break times in school timetables has been [widely reported](#) as one option to consider in addressing the risk of infection.

Assembly and Roll call

Assembly should be smaller groups. Perhaps junior vs senior groups instead of the whole school assembly or do it in year groups, or simply cancel assembly till further notice as [some advice](#) has been.

Marking attendance can be done in class, instead of a separate ‘roll call’ class. These are often used to improve social integration in many schools – intentionally mixing students up who only see each other at these administrative classes. By changing this to be the period 1 class has attendance taken (roll call and notes), we focus on social distancing.

However, in times of global health crisis, the more contact teachers have with students, the higher the risk. The ideal is to have only one teacher per class, if you want to encourage more isolation and social distance.

You may want to schedule in a way to join split classes together, so only one teacher takes it for all lessons. This can be surprisingly easy in schools who don’t use smart software, and improvements of more than 30% are pretty common in a school transitioning to smarter timetabling software.

Teacher doesn’t know my name report

Some students are assigned to a great many split classes, while others are not assigned to any at all. It may be that one student has 8 separate teachers, while others have 16. It can be the luck of the draw, and worse – this is not something timetablers usually ‘see’, as the decisions that relate to which class to split, and who are the teachers – these simply never involve the students themselves in almost every single case – unless you have a very dedicated timetabler, and very good software to report this.

A report named in Edval software is called ‘*Teacher doesn’t know my name*’ report. This is as per the exact menu name. It may sound flippant, but not at all. It refers to a very big problem. The students listed at the top of these reports are the worst affected.

A staggered period zero gives better resource use & socially separate students.

← →	School info	Campus data	Year levels	Grid Structure	Faculty data	Subjects
	MonA	TueA	WedA	ThuA	FriA	
BS	MonABS	TueABS	WedABS	ThuABS	FriABS	
0	MonA0	TueA0	WedA0	ThuA0	FriA0	
1	MonA1	TueA1	WedA1	ThuA1	FriA1	
2	MonA2	TueA2	WedA2	ThuAL1	FriAL1	
R	MonAR	TueAR	WedAR	ThuAR	FriAR	
3	MonA3	TueA3	WedA3	ThuA3	FriA3	
4	MonA4	TueA4	WedA4	ThuA4	FriA4	
L1	MonAL1	TueAL1	WedAL1	ThuAL1	FriAL1	
L2	MonAL2	TueAL2	WedAL2	ThuAL2	FriAL2	

Staffing

Split classes

NSW State schools in Australia often allocate more than one teacher to a class, for the purpose of balancing staffing loads, as per the government requirements. This isn’t done much in the independent sector, or other states of Australia. Schools in the UK often split their *senior* classes intentionally (but not junior). All of them in many cases. To give greater access to a range of teachers.

This shows there are a variety of models, each with good and bad points, relating to split classes.

They are the ones with 12 or even 16 different teachers sometimes. The ability of teachers to know student names is greatly reduced when they see the entire cohort of students from a given year for example. While this is regarded as bad timetabling in general, it now becomes a risk factor in a health crisis. We do not want some teachers having constant exposure to so many different students. Rather, we want one teacher per class. Issues highlighted by these reports show the student impact of split classes (or at least where the split is not a 'by design' split for educational reasons), and one that should be reviewed in difficult times.

A longitudinal study of students' academic performance versus the classes they were in that had more than one teacher would be a very interesting one. Academic performance is noted anecdotally as 'worse' if there is less consistency in teaching, especially in junior classes, but there is an absence of quality data to back this up.

A similar study that maps the instances of virus infection, such as coronavirus 19, against students - together with analysis of how many *different teachers* they had each week may well show a higher rate of infection at schools who have more split classes, and a higher rate of infection related to students who are so affected by split classes. While this needs proper and rigorous scientific research to be able to state with

any confidence on a causal link - what is clear is the message advising social distancing. In this context, would you want to be the student who is taught by 8 teachers, or the one taught by 16 different teachers - all of whom see many other students in the school, for confined space teaching. The ability to address social distancing is very directly related to split classes.

Split partner teachers

Some teachers share several split classes with the same colleague. Others have a split class with this teacher, and another with that teacher and so on. It may be some teachers have five split classes. But they are all split with the ONE other colleague. Yet a different teacher may share a split class with FIVE other, different colleagues.

Smart timetabling reduces the 'partner pairs' that teachers share split classes with. There may not be a lot of contact with these partner pairs, but every time teacher A hands teacher B the exam papers to mark, or the reverse with the projects handed in, there is contact of physical surfaces that students have touched.

Far better to have a teacher share all their split classes with ONE colleague, than share with many different colleagues. It is not an all or nothing thing either, but simply reducing the number of different partner pairs that teachers have,



Smart algorithms assign teacher's hall seats to reduce parent movement.

is reducing an attack vector for a deadly global disease.

If you knew you may save a life, by reviewing the Split partner teacher report in your timetabling software (such as Edval which has this), and acting on this to improve - surely it would be worth it. Quite apart from a duty of care issue, teachers often prefer to simplify their life. So long as they are not paired with their arch enemy in the politics of school life or something, having fewer relationships to juggle is efficient. They can meet about one class, and then carry on to discuss another. They may need one meeting, not five for example in a week.

Duty Roster

Improving the consistency of teachers being assigned a DUTY AREA, will improve social distancing. Students often play in the same areas, and areas have contact points which may carry disease if not cleaned soon after infection. A teacher who does the toilet block for recess on Tuesday, should do it on Thursday too. A teacher who is assigned the top playground this day, should take it another.

Where possible (and it's not a big deal), teachers taking duties in the same area more consistently will reduce the number of contacts with students, as well as reducing the contact with surfaces and equipment.

If your timetabling software doesn't have the ability to optimise the 'consistency of duty area' in the staff assignments, it is time to put in a feature request. Or switch to smarter timetabling software that does, or make manual adjustments to improve this. In a health crisis, if we can schedule to reduce contact, it's worth considering!

Reduced face-to-face

One way to address split classes is to hire more teachers, so they can be better assigned as one teacher per class, in those where this is deemed best. However this is expensive, and which teacher wants to get a job working with a

lot of students in a global health crisis?

Another way is to reduce face to face teaching. It may be that the teacher takes them for some periods, but the other periods the students have no teacher at all, but have to quietly get on with their work. This is effective in smaller senior classes, but less so for large classes of boisterous students needing supervision.

Another way to reduce face to face teaching is to move some lessons online. Students can still attend class, but sit with video conferencing. The Aurora College in NSW, Australia is one example. This school has maybe 150 other schools who have students

scheduled to class, to engage remotely with Aurora college teachers. This is not the 'remote study from home' model, but the 'remote study at school' model.

Parent teacher night interviews

Many schools are rethinking parent teacher night events, or parent teacher interviews (UK) or parent teacher conferences (USA). These events have large numbers of parents come sit with all the teachers to talk about their child's progress. It's a great way to engage, but not so in times of significant global viral storms. Social distancing means these events are not in line with regulations in many countries, that limit social gatherings - sometimes to as few as ten people together. We hope that the viral storm passes soon, but while it's active, we need to schedule events smarter.

Move Interviews Online

Schools can schedule interviews, but have some or all teachers located at home, or other areas, and attend remotely via video conferencing. Parents still get their timetable of interviews, but there is a link for the room, if the conference is online. This is gaining traction in the USA, but also some other areas. It certainly assists parents to not need to attend in person from a time efficiency perspective, but certainly does reduce the virus risk if they are held online - either in part or in full.

A number of schools are [moving parent interviews online](#) now, such as in [New York](#), while others have always had this option.

Room Interviews

Smart timetabling software can dramatically reduce the number of different rooms and teachers who parents need to see. This is known as the teacher-to-rooms algorithm. Edval recently had a breakthrough in 2020, developing a dramatically improved algorithm that is far more efficient. It reduces the need for parents to move between buildings to attend interviews by as much as 50% in one sample tested. It also means far more parents attend one 'room' which has as few as four teachers in it, and the parent has four interviews. The 'grouping' of teachers to rooms is done intelligently, and specifically to reduce parent movement.

Many schools room teachers by faculty groups, when arranging parent interviews. This is poor, as it maximises the need for parents to visit every building or area, as they only have one interview in the 'English' area, and one in the 'Science' area and so on. Efficient timetabling schedules teachers to rooms to maximise social distancing.

These algorithms, such as used in the Edval Interviews module, also dramatically reduce the number of parents onsite at any one time, as they produce highly compact schedules. This means vastly less parent to parent contact at

The elephant in the room: Risk can be greatly mitigated just by smart scheduling.



such events. This is a good thing at any time, as parents can find parking easier, and there are less noisy crowds, but in times of global pandemic, or the 'shoulder times' where there is still lingering concerns - the reduction of parent crowding, and parent movement at these events is critical.

Even if your school runs interviews in one large hall, efficient teacher-to-room algorithms such as recently developed, allow teachers to be groups in 'rows' or 'aisles' in the hall. Thus, most parents need only go down one aisle, as most of the teachers they want to see are roomed in this aisle. Seat numbers can be marked on schedules as Aisles are an 'area' (similar to a building), and the seat is the room in that area. It means parents can very quickly locate the teacher by their aisle and row seat reference. Parents are delighted when they discover most of their teachers are all located together. It reduces fuss, reduces movement and reduces risk of virus transmission, by limiting contact of parents with

each other - sort of isolating them to (some extent) in each aisle.

For parent teacher interviews, who knew, that the process of allocating teachers their room, or their seat in the hall - that algorithms could be so effective at optimising everything. Even the risk of viral transmission - global pandemic or not. And as an added bonus, the focus on rooming teachers for these conferences provides a natural improvement in on-time running. Events that don't hard code teachers to (usually inefficient) seating arrangements notice improvements in reduced event delays. Making it easier and faster for parents to move to their next interview is critical in this area. This is not something that a booking process can achieve, as parents never consider teacher seating when booking interviews manually.

Smart timetabling algorithms can perhaps reduce infection risk at any time, as well as making events better in every possible way.

"Where staff are assigned to cover classes, how well do they know this class? Do they already teach them? Do you want a teacher to internally cover a class of students whom they have never had any prior contact?"

Smart covering classes

Every school needs to manage daily changes. With a global health crisis, this process becomes even more critical. Large scale absenteeism in students and some teachers, cancelled events and much change. It is a stressful time for admin staff at these times.

The focus of social distancing comes into play here though, in some areas.

Large scale absenteeism means more classes should be considered for merging with others, even if they already have a teacher. This is done in other contexts, such as if there are only three students left in a class when a big history excursion is on, one could cover the class (and incur expense), or one could cancel it - and merge this class in with others.

This process should be done with some focus on reducing contact. Not having a class taught by the regular teacher if it's so small may be good. Or maybe not. The decision to merge classes now comes with a new area for decision making. What is the social distancing factor involved in merging this class with another. Which should it be merged with? Should we merge, or should we provide minimal supervision, but not have a teacher there in the small class for the entire period?

Where staff are assigned to cover classes, how well do they know this class? Do they already teach them? Do you want a teacher to internally cover a class of students

whom they have never had any prior contact? It may be you need to remove a teacher from their existing class to cover another, whom they already teach... and assign the first teacher to their class, as they also teach these students in some other class.

There are many areas where a smart timetabler and daily organiser can make a difference. Not just focus on schooling for managing education, or staffing, or the school budget. Rather, a new role of managing social distance in daily changes - a new and potentially very important role to focus on.

Conclusions

Timetabling is a dark art. Few really understand it. Few realise it's power. It's so utterly core to everything a school does, and yet it's usually left to one soul to manage this task, locked away for too long, coming up with the 'solution'. Smarter timetabling software has massively improved this task, and yet there are a great many schools who continue to drive their software in first gear. Who never touch on the true potential of what can be achieved with smarter timetabling.

This is both better software, but also the training and mentoring and support advice that goes with it, or even the concept of outsourcing the timetable with a focus of 'Don't just do our timetable, but show us what more we can achieve by getting creative'. This is where real cost

savings, educational benefits and many others can be enjoyed by schools who dare to change the status quo, and *timetable different*.

There are many things smart timetabling can achieve. A list of just some of the more creative areas are below. Which did you know about? Which will you push to explore and implement?

Improve teacher retention, give some full-time staff a day off, allow teachers to ask for two mornings off instead of one day off, improve student academic performance, reduce behaviour problems, make staff happier, save money – save a lot of money, through smarter resource allocation, decide you don't need to build that new science lab, as existing labs can be smarter scheduled, double the number of parent interviews scheduled, but halve the crowds, while also

increasing on-time running of events...

However – there is now one more to add to this growing list of timetabling opportunities. **Saving lives.** Smarter timetabling can address the critical need for social distancing in a great many ways, and reduce instances of surface contact risk – keeping people in smaller groups, which move less – but which still allow the show to go on.

***Smarter timetabling.
Saving lives? Maybe
it's time to review your
timetabling practice and
technology!***



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