

Stage III: Building The Master Schedule

Month 9
Typically, April

(NOTE: Increasingly schools are beginning the building process earlier, sometimes as early as January, with the goal of having the master schedule and student class schedules ready by early May)

1. Introduction

This is the phase of the master scheduling process where all the previous work pays off and concludes with one of the most rewarding parts: a master schedule that is right for students and teachers. The products from the Student Course Selection phase are relied upon to complete this phase:

- The student course request tally meticulously refined to precise student needs and to only courses that the school is able to offer
- The exact staffing allocation which determines the number of sections able to be offered
- A clear understanding of all special structures to be included in the master schedule including but not limited to:
 - Need for Common Prep Periods
 - Linked or Blocked Sections
 - Small Learning Communities
 - Linked Learning Cohorts
 - Academies
 - Self-Contained Classes
 - Special Purpose Rooms where only specific subjects can be taught

Once you have confirmed that the above listed materials/understandings are in place, you are ready to begin the building process. Before you proceed, begin keeping a Master Schedule Notebook to keep notes on everything that you do. As a suggestion, it may be helpful to start with a copy of the master scheduling manual from your student information system, if needed, cut the spine off of the manual, 3-hole punch it and place it in a binder. Take notes on the pages of the manual and add pages for notes as necessary. Your mind set for this notebook is to use it to remember what to do next year and to pass it on to others so they can learn from your learnings. It may seem like extra work this year, but when you refer to it next year you will be so glad you invested the time. The Master Scheduling Notebook in this online guide may also be a convenient method for keeping notes.

Phases in the Master Building Process

- Implementing Common Planning Time for Pathway/Academy/SLC Teaching Teams
- Examining Cohort/Team Size and Structure for Developing Pure Cohorts of Pathway Students
- Determining and Utilizing an Order for Section/Cohort/Team Placement Order

- Utilizing the Course Conflict Matrix
- Assuring and Maintaining Accurate Section Counts
- Determining Teacher Assignments
- Balancing Seats
- Determining Room Assignments
- Inputting Student Information System Data
- Conducting Simulation Runs, Analyzing Results and Making Master Schedule Revisions
- Finalizing the Master Schedule

2. Implementing Common Planning Time for Pathway/Academy/SLC Teaching Teams

One of the cornerstones of a successful Small Learning Community/Linked Learning Cohort/ Team Teaching structure is for all teachers to have the opportunity to plan TOGETHER. Figuring out how to manipulate the master schedule to provide common planning time for all teaming structures is no easy task. One aspect of the task is a constant and can be calculated; the total number of planning time periods that can be scheduled during each period of the student school day. Let's take a look at an example of a school with the following parameters:

Total number of students – 1500

Total number of teachers – 56

Number of periods an individual teacher is assigned – 5

Maximum student case load for a teacher – 165

Maximum class size – 32

The first step is to determine which parameter is limiting – the maximum case load or the maximum class size. To do this divide the maximum case load (165) by the number of periods assigned to an individual teacher (5) which gives a class size of 33 students. Since 33 is over the class size maximum, we will use 32 as the class size in our calculations.

If there are 1500 students and they are divided up into sections of 32 each, rounding up, 47 sections are needed to accommodate all students (of course, students don't come in nice neat groups of 32, this is just an exercise to explain a concept).

If each teacher is assigned 5 classes and there are 56 teachers, 280 sections of class can be offered.

The difference between 56 (the number of teachers available to teach) and 47 (the number of sections needed to accommodate the students) is 9. Therefore, the maximum number of planning periods in the master schedule per period in this example is 9.

If your school has multiple lunch periods, it is possible to increase the number of common planning periods during one of the lunch periods by having a greater number of students out for lunch. Be careful, this means that there will be a larger number of students in class another period requiring fewer planning periods.

This understanding is especially helpful when meeting with your master scheduling team, team leaders and team members during the planning stage. In this case, a team with more than 9 members would not be able to share a common planning period. Demonstrating this through the use of “the numbers” avoids misunderstandings that interfere with the master scheduling process.

Does this calculation work with block scheduling? YES!! The type of bell schedule does not make a difference in this calculation. Notice that above the statement is “Number of periods an individual teacher is assigned” – if the teachers in a school meets with 3 of their assigned classes on Monday, Wednesday and Friday, then meets with 2 classes on Tuesday and Thursday, and then this pattern flip-flops every other week; the teacher still has 5 periods.

As mentioned above, students don’t come in neat class size packets, so this calculation is just “awareness” for the master scheduling team that there is a limit and there needs to be a balance in the distribution of planning periods

Tools

Common Planning Time Estimator with instructions imbedded in this Excel document
This Excel spreadsheet gives you an estimate of the total number of teachers that can be given planning during a single period based on school parameters you enter.

3. Examining Cohort/Team Size and Structure for Developing Pure Cohorts of Pathway Students

There are several factors that combine to contribute to a school’s ability to keep Cohort/Team courses pure; size and structure are two of these contributing factors. The size and structure of a Cohort/Team significantly influence the master scheduling process. Specific combinations of the number of students involved and the number of periods that students participate in a cohort/team support placement in the master schedule and, unfortunately, some combinations of these factors do not. Let’s take a look at an example of a cohort/team with the following:

- A 6 period student day
- Faculty that teach 5 periods per day
- An Cohort/Team with 120 students
- An academy with 4 teachers
- A class size of 30 students
- The 120 students are divided into 4 groupings of 30 each: A, B, C, D

(Each letter represents a group of 30 students in this pathway)

	Per 1	Per 2	Per 3	Per 4	Per 5	Per 6
Course 1	Prep	A	B	C	D	
Course 2	Prep	B	C	D	A	
Course 3	Prep	C	D	A	B	
Course 4	Prep	D	A	B	C	

The features of this schedule:

- Common prep
- Teachers teach one period out of the academy
- Students take 4 classes in academy and 2 out
- Students in academy can go out for classes during periods 1 & 6
- Academy field trips complicated by 6th period outside class (students in academy periods 3-6 improves the ability to take field trips)
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Add 30 more students and see the difference...

	Per 1	Per 2	Per 3	Per 4	Per 5	Per 6
Course 1	Prep	A	B	C	D	E
Course 2	Prep	B	C	D	E	A
Course 3	Prep	C	D	E	A	B
Course 4	Prep	D	E	A	B	C

The features of this schedule:

- Common prep
- Teachers teach all 5 periods in the academy
- Students take 4 classes in academy and 2 out
- Students in academy can go out for classes during any period 1 – 6 (a student can change to another group to go out any period for a specific course)
- Academy field trips complicated by students taking classes outside of the academy during all periods of the day

Developing a structure like the second example has a couple of significant advantages that translate into an improved educational experience for both students and teachers. The 5 groupings of students that travel together through the classes in the cohort/team aren't an absolute requirement to provide the advantages of this configuration; it is more of a convenience for explaining the concept. As long as an individual student can have their schedule arranged in the team to accommodate any two periods out for courses not offered in the team, the advantage is met. Suppose a student in Group A wants to take a World Language course outside of the team that is only offered during 4th period. In the first example, the student has to make a decision – leave the team or don't take the World Language course. In the second example all that needs to happen is to switch the student from Group A to Group B.

Another advantage of the second schedule is that the teachers in the cohort/team are full time members – they don't have a lone class outside of the cohort/team. Once a teacher is a member of a team, there is a possibility that any classes taught outside of the team might not be given the same

priority as the team classes, but don't apply this as a given. As individuals, teachers have individual preferences; a cohort/team teacher may prefer to have an outside class, especially if it is a specific "pet" course. This relates back to the importance of the faculty survey of teaching preferences.

Tools

Cohort Size Calculator with instructions imbedded in this Excel document

This Excel spreadsheet helps you determine the optimum number of students needed for the cohort structure you are planning.

Importance of Cohort Size and Structure

This is a short PowerPoint slide presentation demonstrating the effect of cohort size and structure on the master schedule.

4. Determining and Utilizing an Order for Section/Cohort/Team Placement Order

When at this stage in the master scheduling process, there are so many things going on at once, it is easy to see why many scheduling teams don't know where to start. Any specific section placement order needs to be carefully examined for compatibility with the priorities of the school. There are likely more opinions about placement order than any other aspect of the master scheduling process especially with the inclusion of cohorts/teams in the mix. In addition, a school may have circumstances that require a specific, mandatory placement of a section, for example, an itinerant teacher that is only available for one period. Once mandatory placements are made, conventional wisdom purports the placement of the most highly enrolled singleton section first, followed by the remaining singletons in descending order of enrollment. This is followed by doubletons in the same order and so on.

With the inclusion of cohorts/teams, there is good reason to reexamine the section placement process. A school isn't usually able to change the mandatory placements, so they will be a given, but the placement of cohort/teams may need to supersede or at least share the placement order with the singleton progression. As described previously, common planning time is one of the cornerstones of a successful cohort/team. Since there are a finite number of preparation periods that can be offered each period of the day, it may be advantageous to preplan all cohort/team section placements. This same preplanning is also helpful when scheduling classes for any group of students who take a designated group of classes. Examples of these groups of students are language learners and special education students who take some regular education classes during the school day. This helps identify where sections need to be placed for students when they are not in sections with their designated group.

There are many methods to physically place section representations on something to keep track of the process. Many use graphic aids like magnet boards or dry erase boards while others do it all on a computer. Most eventually find that having a large display board of some type serves well for tracking the process and doubling as a communication tool. A suggested approach is to use a large magnetic board and make one piece of labeled magnetic material for each section in the master schedule. The use

of colors to represent the specific elements of the master schedule is extremely helpful (Pathways/Academies/SLC's/Departments).

After the placement of sections for cohort/teams, special education and the singleton progression, the course conflict matrix can be utilized to complete the section placement process (see next topic). The main thing to remember at this point is BALANCE. The end goal of section placement is having sufficient seats each period of the school day for all students in each grade level. The best way to approach this is to balance the number of sections and planning periods throughout the school day. Some sections are specific for a particular grade level (English 12) and are easier to distribute; others (Algebra 1) may have students from several grade levels and are more difficult to distribute to keep balance.

The first layout of all the sections most likely will not be perfect, but it can be very close. The following three sections on the Course Conflict Matrix, Section Counts and Seat Balancing will help you see the way to a schedule that is ready to finalize.

5. Utilizing the Course Conflict Matrix

The course conflict matrix is a tool usually generated by the student management software utilized by the school. Its accuracy is dependent on having all student course requests input accurately. If changes are made in the course request of students, run a new conflict matrix to use for section placement. The conflict matrix printout is usually quite a long document, sometimes exceeding 100 pages. But, don't let this scare you off; the conflict matrix is one of the most useful tools for developing a competent master schedule and once you get used to using it, you won't want to schedule without it.

The conflict matrix is a course by course listing showing the number of students who requested a specific course along with all the other courses that were requested by these same students. A couple of examples will make this clearer:

Below is an edited version (for example purposes) of the conflict matrix for the course Calculus:

Calculus – 32 Requests	
Course Title	Number of Requests
Advanced Band	3
Art Design	2
Biology	22
Chemistry	2
English	32
Filipino	3
French	7
Government/Econ	32
Journalism	2
Leadership	2
Marching Band	10
Physics	13

Spanish	12
Studio Art	1

This shows that 32 students requested Calculus. Among these 32 students, 3 requested Advanced Band, 2 requested Art Design and so on. With 32 students requesting Calculus there will usually be just one section of this course placed in the master schedule, making Calculus a singleton. If any of the other courses requested by the Calculus students are also singletons, these other singletons should not be scheduled during the same period as Calculus. An example of this would be Marching Band which is usually scheduled as a singleton. If Calculus is scheduled during the same period, 10 students will have to make a choice between these two classes. This is one of the major values of using the conflict matrix, being able to avoid scheduling conflicts.

This is another edited conflict matrix example, this time for the course Biology 1:

Biology 1 – 93 Requests

Course Title	Number of Requests
Advanced Band	8
Algebra 1	6
Algebra 2	31
Art Design	1
English 10	62
Filipino 1	11
Filipino 2	2
French 1	5
French 2	10
Geometry	16
Student Leadership	2
Marching Band	12
World History	44
Photography	1
Spanish 2	7
Spanish 3	12
Spanish 4	2

Since 93 students signed up for Biology 1, there will most likely be 3 sections placed in the master schedule. Unless there is a very specific reason not to do so, it is best to place multiple sections of a course in different periods. If you were to place the three sections of Biology 1 all in one period, you would essentially be converting it into a singleton which would increase the potential for scheduling conflicts. Again looking for singletons in the other courses requested by the Biology 1 students, there are 12 students who requested Marching Band. Since there will be 3 different periods where a student could take Biology 1, it is not absolutely necessary to place Marching Band in a different period from all three sections of Biology 1.

You will get to a point where you are not able to place a section without there being a conflict for students. In this situation, determine how many potential conflicts would occur for each period in your master schedule and place the section in the period with the fewest conflicts.

As you can see, as you proceed through the process of placing sections, the conflict potential increases; just be patient, utilize the information in the conflict matrix and avoid as many conflicts as possible. The schedule you develop will be very close to your final version and any adjustments that need to be made will be easier to accomplish.

Other very useful information can be generated from the student course request data; the equity of student access to the courses offered. Imagine you offer an Engineering Academy and you want to know if the students who signed up are representative of the school’s student population. Unfortunately, most student information systems don’t provide easy access to this data. If your student information system has a query capability, you may be able to generate the information. If you are able to export data from your student information system and open the data in a program like Excel, you will be able to generate the information yourself.

Back in the section on inputting student course requests, it was strongly suggested that students in cohorts/teams (and any other special structure) be “tagged” in some way such that they can be uniquely identified. Here is one place where this extra effort pays off. The student information system contains the demographic information on the student, the course requests and the special tags. What needs to be done is to collect a set of this information to analyze. For the Engineering Academy example, you would want the set of students tagged for the academy, and probably their gender and ethnicity. Once you analyze this data, it can be compared with the school population to determine equity. Here is an example using fabricated data exported from the student management system and analyzed using pivot tables in Excel.

	Total School Population								
	African American	American Indian	Asian	Decline to State	Filipino	Hispanic	Pacific Islander	White	Grand Total
Female	50.3%	50.3%	50.3%	50.3%	50.3%	50.3%	50.3%	50.3%	50.3%
Male	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%
% of Total	37.6%	0.8%	2.2%	0.4%	17.5%	29.0%	2.3%	10.1%	100.0%

	Engineering Academy Population								
	African American	American Indian	Asian	Decline to State	Filipino	Hispanic	Pacific Islander	White	Grand Total
Female	25.0%	0.0%	7.4%	100.0%	18.2%	25.0%	33.3%	25.0%	18.9%
Male	75.0%	100.0%	92.6%	0.0%	81.8%	75.0%	66.7%	75.0%	81.1%
% of Total	4.4%	1.1%	30.0%	1.1%	24.4%	4.4%	3.3%	31.1%	100.0%

How does the student population of the Engineering Academy compare with that of the school? Again, this data was fabricated to demonstrate the analysis potential of using data from your student information system. Once students are scheduled in classes, similar procedures can be used to follow changes in course composition over time – at the end of a semester and at the end of the school year.

6. Assuring and Maintaining Accurate Section Counts

Once you have confirmed your total teacher staffing allocation, you know exactly how many sections you have to work with in developing your master schedule (number of teachers multiplied by the number of sections taught by each teacher). That's the easy part. Deciding how many sections to allocate to each course and keeping track of the total number of sections allocated can be a bit more time consuming. Hours spent counting sections and trying to figure out where to cut sections (usually one doesn't have the luxury of adding sections) to meet the staffing allocation can be frustrating, especially when successive counts yield different results. But it doesn't have to be. The tool to support this stage in the master scheduling process will:

- Help you keep track of the section count for cohorts, departments and school wide
- Helps you decide where you can cut (or add) sections
- Helps you determine the number of seats per grade to count for sections with students from various grades
- Helps you keep track of your staffing allocation

The Section Tally and Staffing tool is an Excel spreadsheet primarily organized by school departments. With the trend of including more cohorts/teams in the school schedule, this by department organization may, at first, seem out of place. Looking at the way teachers earn their credentials, the way they are hired, the way sections are assigned to teachers, the way curriculum is organized, the way mandated testing is organized and the way graduation requirements are listed shows the usefulness of this organization. This by department organization facilitates the section counting and teacher assignment tracking while not impacting the scheduling of cohorts/teams.

The set-up for this tool involves entering scheduling information including the projected student enrollment, class size criteria, staffing allocation and the number of periods in the school day. Then the courses and request counts from the student course request tally are entered. Upon entering this data, the spreadsheet suggests the number of sections needed for each course. You enter the number of sections you want and the spreadsheet keeps track of everything. Another section of this spreadsheet keeps track of teacher assignments and monitors the total teacher allocation.

If you have your staffing allocation, your projected student count, and your final student course request tally, you are ready to click on the link below to download the Section Tally and Staffing tool and instructions.

Tools

- **Tally and Staffing** with PowerPoint instructions

The Section Tally and Staffing tool is an Excel spreadsheet designed to support the building stage in the master scheduling process and will:

- Help you keep track of the section count for cohorts, departments and school wide

- Helps you decide where you can cut (or add) sections
- Helps you determine the number of seats per grade to count for sections with students from various grades
- Helps you keep track of your staffing allocation

7. Determining Teacher Assignments

When the new principal asked a veteran teacher what he taught the response was, “I teach kids.” You ask a student what her favorite **subject** is and the answer is most frequently the name of a **teacher**, not the subject. If that teacher announced the subject of the class was going to switch from history to math, it wouldn’t matter to the student. The point here is that there is a lot more to consider when assigning teachers than the authorizations. This characteristic of a teacher with a wonderful blend of the art and science of teaching with the ability to build professional relationships with students and a positive learning environment based on respect has been labeled by Bill Loudon, former professional development trainer with the Vallejo School District, as “withitness.” It would be wonderful to have an entire staff of with-it teachers; assignments would be simple. But just in case some of your teachers need to grow into the withitness arena, assignment decisions need to be carefully thought out.

In many high schools, the most senior teacher “earns the right” to teach only the higher level classes. This may or may not be what is best for students; it is an area of assignment to consider. Using mathematics as an example, in a high school, first year algebra is usually not looked at by teachers as the most wonderful course to teach, especially if your assignment is a full teaching load of this course. It is usually the beginning teacher who gets such an assignment and there is no better way to put a beginning teacher in a position to rethink their career choice. Dividing the lower level classes among all of the qualified teachers is an option to consider. In one case where this was done, the first year algebra students of the veteran, calculus teacher had far fewer discipline issues in class, performed considerably better on the end of course exam and a higher percentage continued on to higher levels of math when compared with the other first year algebra students.

In the example above, the math teacher was one of those you would like to clone, one possessing a high degree of withitness. Other teachers recognize this in a teacher and truly aspire to emulate it. This is the teacher that would make a great mentor, but you wouldn’t want to do anything to reduce the number of students seen by this type of teacher. An option is to assign this teacher to a team. One of the many wonderful outcomes of assigning the with-it teacher to a team of teachers who provide the instruction for a cohort of students is the professional growth of the teachers. If formed correctly and supported, the team of teachers becomes a synergistic “work family” where the outcomes for students soars.

Forming teams of teachers is a very involved task and takes really knowing the teachers involved. Of course, teaching authorizations have to be considered. You can help the teaming and scheduling process by hiring teachers with multiple authorizations. Make connections with college teacher credentialing programs and encourage the attainment of multiple authorizations. Also, encourage any of your current teachers to complete additional authorizations. The big question is how well will the team of teachers

function. Taking into consideration factors like personalities, work habits, teaching preferences, professional commitment and many more, it is still a gamble. That is why it is important to support the newly formed team with some form of staff development on team building and working together as a team. One of the critical attributes for a successful team is to build an atmosphere of cooperation and collaborative problem solving. Each teacher needs to understand that everyone is trying to do his/her best and to be tolerant with differences of opinion. Another great thing to do for a team of teachers is to give them time to get to know each other – unstructured time. As Plato said, “You can discover more about a person in an hour of play than in a year of conversation.” The topic of assigning teachers to the best fit of classes and team composition and development could occupy volumes; the intent here is to provide awareness that there is a lot more to it than just looking at authorizations.

At this stage in the master schedule construction process you will have a magnet board or some other representation of your master schedule all filled in showing “when” (the vertical columns of sections) all the sections of class will be taught. Two additional questions need to be answered, the “where” (the classroom assigned to the section) and the “who” (the horizontal rows of sections). The “where” will be dealt with in the Room Assignment part of this guide. During the process of assigning teachers to the horizontal rows, look at the teaching schedule, the horizontal row, from a teaching standpoint. How many different course preparations will the teacher have? For some teachers having multiple sections of just one course is desirable and for other teachers it is not. Are there jumps in the progression of classes where two sections of the same course are separated in the schedule by a different course? Are jumps an issue for this particular curricular area; they may be in courses like science lab classes. If adjustments need to be made, moving sections up and down along vertical columns will not affect balancing or cause conflicts. It is always a good practice to involve the master scheduling team and any teachers who may be affected in this process.

Once you begin the process of assigning teachers to each section in the master schedule, how do you keep track of the assignments? Does your student information system keep track of the number of sections assigned to each teacher and provide you with information if too few or too many sections have been assigned? How do you know when you have assigned your allocated number of teachers? The part where this may get a bit tricky is where a teacher has classes in more than one area, for example an English teacher with 4 sections of English that also teaches one French class. In a number of systems, this teacher’s name is listed twice, once with the English department and once with the World Language department. Sometimes this can be a difficult tracking job. As mentioned in the Section Counts part of this guide, the Section Tally and Staffing tool also helps you keep track of your staffing allocation. There is an area in the tool to enter teacher names with the number of sections being taught in each department and/or team. In the above example, this teacher’s name would be entered in the English department with the number 4 listed as the number of sections taught. This teacher’s name would also be listed in the World Languages department with a 1 listed as the number of sections taught. In another area of the Section Tally and Staffing tool, the staffing summary area, this teacher is listed once and the sum of all sections assigned is listed, in this case the number 5 would appear. It will also tell you how many times you have listed this teacher in the various departments; in this example it would be 2 – one for the English department and one for the World Language department. If this is a full

teaching assignment this summary section would indicate that this teacher is fully assigned. If too many or too few sections of class are assigned, the summary section will let you know. The Section Tally and Staffing tool and a PowerPoint with instructions for the use of the tool are available for download in the Tools section below.

TOOLS

- **Tally and Staffing** with PowerPoint instructions

The Section Tally and Staffing tool is an Excel spreadsheet designed to support the building stage in the master scheduling process and will:

- Help you keep track of the section count for cohorts, departments and school wide
- Helps you decide where you can cut (or add) sections
- Helps you determine the number of seats per grade to count for sections with students from various grades
- Helps you keep track of your staffing allocation

8. Balancing Seats

Once you have constructed the master schedule with all the sections in place and before you push the button for your first simulation run (SIM run), checking the seat balance can be a very helpful practice. Seat balancing is a procedure that counts, by grade level, the number of seats available for students each period of the day. This procedure may be looked upon as an “old school” technique that is no longer needed, but the knowledge and use of this procedure can save quite a bit of time. Some of the recent iterations of student information systems (SIS) include a form of seat balancing so this balancing method may not be something you will use. If your SIS does give you seat balancing figures, there are a couple of things you should look for to make sure the counts you are helpful.

Some of the SIS programs simply give you a count of the total number of seats available for students for each period, irrespective of grade level. A real imbalance in a period where there is an overabundance of seats for one grade level and too few seats for another grade level will be masked if you are just given total seats per period. Another issue is the way the SIS counts the seats available in each section. Some SIS programs use the class size maximum as the number of seats to count. This is all well and good if you are counting seats in a class open to all students like an English class in grade 9. It doesn't work that well if we are counting the seats for an advanced course where only 25 students have requested the course. The SIS programs that use the student course request numbers divided by the number of sections in the master schedule, come much closer to giving you accurate numbers. If your SIS gives you seat counts, the message here is to be sure you understand how the numbers are calculated.

If you are not able to get helpful seat counts from your SIS, you have a couple of choices. You could just go ahead and conduct a SIM run and look at the results using the analysis reports from your SIS program. These reports are usually quite helpful in guiding you through adjusting your master schedule. Taking this choice, one would follow a cycle of making adjustments, conducting SIM runs and analyzing

results until satisfied with the master schedule. Because of the speed of SIM runs these days, many choose this option and do a very fine job of developing a master schedule.

Another option would be to do your own seat counts. It really isn't as complicated as you may think. Many of the teams involved in master scheduling, for a number of reasons, construct their own copy of the master schedule using Excel, Word Tables or other similar software. If you do this in Excel, you are just a few adjustments away from doing your own seat counts. Our Master Schedule tool is an Excel spreadsheet that is set up to calculate total seat counts by period and by grade, but it does take a couple of hours to set up. The tool is a blank template; you fill in all the regular information like teacher name, schedule of classes and room numbers. For each class there is a place to enter the number of students (by grade) that can be assigned to the class. Let's say the class size maximum is 32 students and there are a total of 320 grade 9 students in school. If we look at a grade 9 course that all students take like English 9, in most cases there would be 10 sections of this course in the master schedule. For each of these sections in the place where seat counts are entered for grade 9 students, the number 32 would be entered. In an example where 50 students signed up for a course where only 2 sections are allocated, the number 25 would be entered for the seat count in each section. In mixed grade level courses, you have to do a little math to figure out the "splits" for entering the proper numbers for the seat count for each grade. If you are offering one section of a class with 14 grade 9 and 18 grade 10 students signed up (total of 32), those numbers go into the appropriate places for the grade level seat counts. But if 70 grade 9 and 90 grade 10 students sign up (total of 160), the "splits" aren't as easy to see. You can do the math – divide the total number of students (160) by the maximum class size (32) to get the number of sections of the course (5). Then divide each grade level count (70 & 90) by the number of sections (5) to get the "splits" to enter in each section of the class (14 & 18).

Another option is to use the calculations that are already done for you in the Section Tally and Staffing tool explained in the Section Counts portion of this guide. Once you fill in all the student course request information and the section counts information, the "splits" are calculated for you.

Once you enter your master schedule information with the counts by grade and your projected enrollment counts, the Master Schedule Board tool adds all the seat counts by grade and period. These totals are put in a chart that also shows if you are balanced – if you have enough seats each period for students in each grade. The chart also converts the seat count into a section count by grade level for each period. This information is then used to balance the master schedule. For example, imagine an unbalanced schedule where there are not enough seats for grade 9 students in 1st period. The seat count chart will show a minus number for grade 9 seats in period 1 and the equivalent number of sections will also show as a minus number. The next step is to look at over the chart in the other grade 9 periods to see if any has sufficient extra seats (or sections) such that a section can be moved to period 1. It is usually easier to move a section of a course where multiple sections are offered. Once a section to move is located, go back to the master schedule board portion of the spreadsheet and make the change including the seat counts. Be sure to keep the course conflict matrix in mind during the balancing process. Then go back to the seat count chart to see the effect of the change. Continuing through this process until there are no minus numbers gives you a balanced schedule.

TOOLS

- **Master Schedule Board** with PowerPoint instructions

This Excel spreadsheet is a ready to fill in, blank master schedule board template able to accommodate up to a 9 period schedule. Once filled in it gives seat counts by period and grade, section counts by subject and period, and a number of other tables showing the balance of your master schedule. When balancing a master schedule, the tables in this spreadsheet are extremely helpful. In addition, the spreadsheet evaluates the impact of mainstreamed special education students on the master schedule.

9. Determining Room Assignments

When making room assignments there are many factors to consider. Whenever possible, it is usually best to avoid room sharing. When this is not possible, attempt to limit room changes to just one and have the change occur after the teacher's prep period or following lunch. An example of making room changes to accommodate an additional teacher can be viewed in the PowerPoint "Making Room Assignments" in the Tools section.

Assigning rooms to cohorts of teachers can be somewhat problematic. Usually, the most desirable room assignment for cohort teachers is in a block of rooms next to each other. Unfortunately, many of our schools were built before the concept of cohorts. In these schools you might find clusters of specific rooms in one location or building like the science lab rooms. In these situations, be sure to include cohort teachers in the decision making and make room assignments that best support the cohort.

Another problematic room assignment situation occurs in schools with more than one lunch period. Trying to conduct class in a room that borders a central quad during a lunch period isn't always the most desirable situation. One approach to consider is to assign teachers with the best classroom management skills to these rooms. Another strategy is to assign classes for seniors in these rooms during any class periods that coexist with a lunch period. Hopefully, the seniors are a bit more mature and will be able to overcome any distractions.

Cohort teachers with a common prep have a tremendous support system. One of the best things you can do for a new teacher who is not a member of a cohort is a room placement next to a wonderful mentor teacher, the department chair if possible. One additional help would be to have the new teacher and the mentor share the same prep period. This doesn't fall into the room assignment category, but mentioning it here seems appropriate.

The Master Schedule Board tool has a companion spreadsheet – Room Assignments. This Excel spreadsheet requires some initial setup; in one column all the room numbers need to be entered and in another column all the teacher names need to be entered. Once this is done and the Master Schedule Board tool is filled out with teacher names and room location for each period, two charts are automatically filled in. One chart is the list of rooms in the setup order with the name of the teacher in the room for each period. The other chart is the list of all the teachers in the setup order with the room number the teacher is in each period. If two teachers are assigned to the same room during the same period, the room numbers appear in bold, red, strikethrough text.

TOOLS

Room Assignments with PowerPoint instructions

This Excel spreadsheet is a companion to the Master Schedule Board spreadsheet. Once the Master Schedule Board spreadsheet is filled out, with a very small amount of input, Room Assignment produces two lists: teachers with each assigned room by period and rooms with teachers assigned by period.

10. Inputting Student Information System Data

The Student Information System (SIS) can be your best friend or your worst enemy. Fortunately, there are things to do to make sure your scheduling team and your SIS are on the best of terms; it sounds cliché, but read the manual and participate in any of the training sessions that are offered on the use of the master scheduling module. Each SIS master scheduling module has its learning curve and most are steep and long. While digging in and really learning the system isn't the most enjoyable activity, the results in knowing how to make the system work for your students are worth the effort. It is quite helpful to approach the study of the master scheduling module with a "how do I apply this" mind set; take a step at a time and apply it to your actual situation. When difficulties are encountered, you then have a very specific question to clarify. By the way, be sure to have the contact information for the help desk for your SIS. Study also to learn how to accomplish specific outcomes, for example, how to make sure a cohort of students is assigned to the correct classes. By doing this the learning curve can be a bit easier to digest. One warning, your team may become the go to team for others who have not studied the system as fully, but that's really a good thing.

Data input is usually pretty straight forward, but tedious and unforgiving of mistakes. If the Master Schedule Board tool described in the Seat Balancing part of this guide has been used, it is quite helpful to use as a guide while entering data into the SIS. The setup for entering the master schedule usually involves entering information like the teacher names and course names with specific course parameters like course number, course duration and credit value. Many of these setup needs could be set up at the district level as well as at the site level. Once the setup is completed, each section of the master schedule is entered. Typically, a course number is entered, a period placement is entered, a teacher name can be entered at this time and a room number can be entered. Many SIS systems have procedures to enter multiple sections of a course all at once saving quite a bit of time. This procedure is followed until all of the sections of the master schedule are entered.

Some SIS master schedule modules have what is called a Builder. This is a tool that combines information like the student course request information, specific teacher information, bell schedule information and specific room information to make a master schedule for you. This sounds great, so why did we go through all the previous steps? Most master schedule teams who have used the Builder feature quit using it soon after their first experience. Entering all the individual teacher and room parameters to make the Builder work takes quite a bit of time. Once this has been done and the results are examined, most agree that the results weren't worth the time spent. The consensus is that going

through the steps saves time and gives better results. Hopefully, with new generations of Builders, improvements will be made so that they are much more useful.

One very important feature needed in an SIS is the ability to “Tag” students, sections and sometimes courses. A “Tag” is a special designation that allows a specific category to be identified. One tag that is always in an SIS is grade level. If you wanted assign all grade 9 students to a specific course like English 9, most student information systems have a procedure to select by grade level to allow this to be done. When building cohorts (usually called teams or groups in an SIS), it is very important to be able to tag the sections of class that the students will be taking. Most systems have a procedure that allows cohorts to be scheduled. Unfortunately, the system for doing this can be confusing and sometimes does not yield the expected results; cohorts are not pure and some students intended to be in the cohort are scattered out in non-cohort sections. This area of the master schedule module of the SIS needs to be fully understood to be effectively used.

An alternative approach to scheduling pure cohorts is to create unique courses that only students in the particular cohort have as requested courses. This method usually comes into play when we just can’t get the SIS to do it and we are running out of time to learn the SIS method. As an example, let’s take English 9 with a course number of 1000. All grade 9 students are enrolled in this course. Ninety students have been identified to participate in a cohort and they all need to be scheduled with the same English teacher. Create another English 9 course (sometimes called a dummy course) with the course number 1001 and change the course request of the 90 students. Most systems have a “mass move” function that will quickly accomplish this change. Once the scheduling process is over and before school begins, change the students in course 1001 back to 1000 if there are any issues with college course or NCAA approval. If possible, it is very helpful to counselors or those who schedule students throughout the school year to have a way in the SIS to identify the cohort sections. If a variation in the name or course number is allowed, it helps prevent an accidental student placement into an otherwise cohort.

It is also very important to be able to tag the students in a cohort; it makes mass changes like the one described above quite easy and it is especially important if any statistical studies are going to be made relative to the educational effectiveness of the cohort. Most student information systems provide the user with places in the SIS where called “User Defined Fields” where this information can be entered. It usually involves a district level decision to designate a User Defined Field for a specific student tag.

A tremendous amount to data is stored in an SIS, and most systems have a very comprehensive selection of reports. It is advisable to become familiar with what is available; most, if not all, of what you would normally want is contained in one of the supplied reports. When you are not able to find what you need in the supplied reports, there usually are two other methods to generate information from the SIS. The first method involves writing what is called a query. There is an area in the SIS that you use to do this. Using a fairly easy sentence to construct, you tell the SIS to get the information you want. The second method is to export information from the SIS and manipulate the information in a program like Excel or Access. Both of these methods are beyond the scope of this guide, but are mentioned here for awareness.

One pet peeve of this author (Phil) is the deplorable aspect of the report card that is produced by most of the student information systems; most are quite unattractive and missing an opportunity to provide parents and students with valuable information. In my days as a principal, I revolted and we developed our own report card. All of the data was downloaded from the SIS; we just organized it in a much more presentable way and received a tremendously positive response from students and parents. The new report card, printed on legal sized, school letterhead paper and our mascot shadow printed as a watermark, had all the regular information of letter grade, course title, credits earned, teacher name, comments, grade point average for the term and cumulative grade point average. In addition, we added the credits earned to date toward graduation and the credits remaining to be earned by subject. This same assessment was done relative to completion of college acceptance requirements (a-g requirements in California). Also included was a chart showing attendance information in each period for the term including absences and tardiness. From this data, various comments were inserted ranging from very positive ones describing the student as outstanding and a source of pride for our school, to comments of encouragement to improve. This was a very complex task and took quite a bit of time, but we all felt it was extremely valuable. This is mentioned here for awareness of things that can be done and hopefully, some SIS will pick up on the idea and make it an automatic part of their system.

To close this section out it should be mentioned that some schools use the current year's master schedule and make adjustments to make it work for the next school year. This is usually called "rolling over" the schedule. Several factors should be fairly stable for this to be helpful including student counts, course request counts and staffing. When rolling over works for a school, it can save quite a bit of time. If you try this and find that you are spending quite a bit of time making adjustments, it may not have been the best choice. Evaluate the factors carefully before making a choice to roll over your schedule.

11. Conducting Simulation Runs, Analyzing Results and Making Master Schedule Revisions

With all the sections of the master schedule entered in the SIS, you are ready for the Simulation (SIM) Run. It doesn't matter how many years you have been constructing master schedules, "pushing the button" for a SIM run is always met with anxiety. Here is where all your months' worth of work is evaluated in seconds. If the results show that 90% or more of the students are scheduled – Congratulations, you are a master!! In a school of 2000 students with a 95% scheduled result, 100 students are left to be scheduled. If you have 5 people to fix unscheduled students, each person has 20 students to schedule. This is usually very doable. But before you turn it over to hand scheduling and especially if your percent scheduled is low, take a look at the result of scheduling reports that the SIS produces. These reports are usually very helpful in identifying problems to correct that will improve the scheduling percentage. The typical problems encountered include entry mistakes like placing a section in the wrong period thus creating a conflict and forgetting to enter a section causing insufficient seats to be available. These reports will also identify scheduling conflicts in sections that have been placed such that some student schedules are not possible to fulfill. The reports will help you analyze and correct these issues. In this situation, it is helpful to identify individual students to see the entire schedule. I can't tell you the number of times I have done this to find that there is no problem scheduling the

student. For whatever reason, the scheduling logic of the SIS appears to get stuck in a pattern where a specific course is scheduled and because of the placement of this course, another course placement is eliminated. I am really not sure that this explanation is correct, what I do know is that the SIS has labeled students as unscheduled when the students are able to be fully scheduled.

When using the scheduling results reports, look for patterns. You may find that by changing the placement of one section, a new SIM run results in a significantly higher percentage of scheduled students. If you used the Master Schedule Board tool described in the Seat Balancing part of this guide, go back to the seat count section to see if there are periods with enough extra seats to move a section to a period with a lower seat count. Sometimes moving a course that is open to students of multiple grade levels gives just enough extra room to make a difference. Be sure to make the changes in the master schedule section of the Master Schedule Board tool along with the student count changes so the seat balancing section will be accurate. At this point you are in a cycle of completing a SIM run, examining the results, and making adjustments for the next SIM run. Since SIM runs are extremely quick, this process can be repeated many times to obtain the desired results. If you make a change that decreases your scheduled percentage, just analyze why this result happened and undo it for the next SIM run. It is also extremely important to keep accurate notes of every change you make and the results of the change. During this process keep every report that is produced and only put the useless reports in the recycle bin when all students are scheduled – if you need to go back and see something from the past you will be very thankful for keeping the stack of reports.

Most of the student information systems allow you to save the results of SIM run and give it a title. This is a great feature to have if you really get in a mess and need to restore a previous version of the schedule. Be careful to name these saved versions such that you can retrieve the one you need and keep separate notes on each one; again, you will be glad you did.

12. Finalizing the Master Schedule

When you are satisfied with the SIM run results, there will be a procedure in your SIS to “lock in” the results. It is such a wonderful feeling of accomplishment. There are just a few more things to complete that will be discussed further in Stage 4. These aren’t as labor intensive as constructing a master schedule, but are very important to complete and usually before school is out for the summer. Teachers need to have their schedules. This just makes sense that this is done before school is out for the summer. Also, there may be a contractual deadline for providing this information so be sure your master scheduling timeline meets this deadline. It also makes sense for students (and parents) to know their schedules before summer break, but many schools choose to wait until the beginning of the school year. This is sometimes done to avoid complaints from students or parents about placement of classes in the day or for teacher preferences. The communication to students/parents only needs to state the scheduled courses, nothing else. If students are scheduled into incorrect courses, they can be directed to the procedure to correct the mistake. These are the types of errors that you really want to correct before school starts next year and a main reason to provide schedules to students before school is out for the summer.

Finally, add your final notes to your Master Scheduling Notebook. You will be so glad you invested the time to keep track of what you did and learned.