

Gains Analysis

Norwalk Public Schools

MATH 180 Course I
MATH 180 Course II

Results Based on Program Data 08/01/2016–01/20/2017

Executive Summary

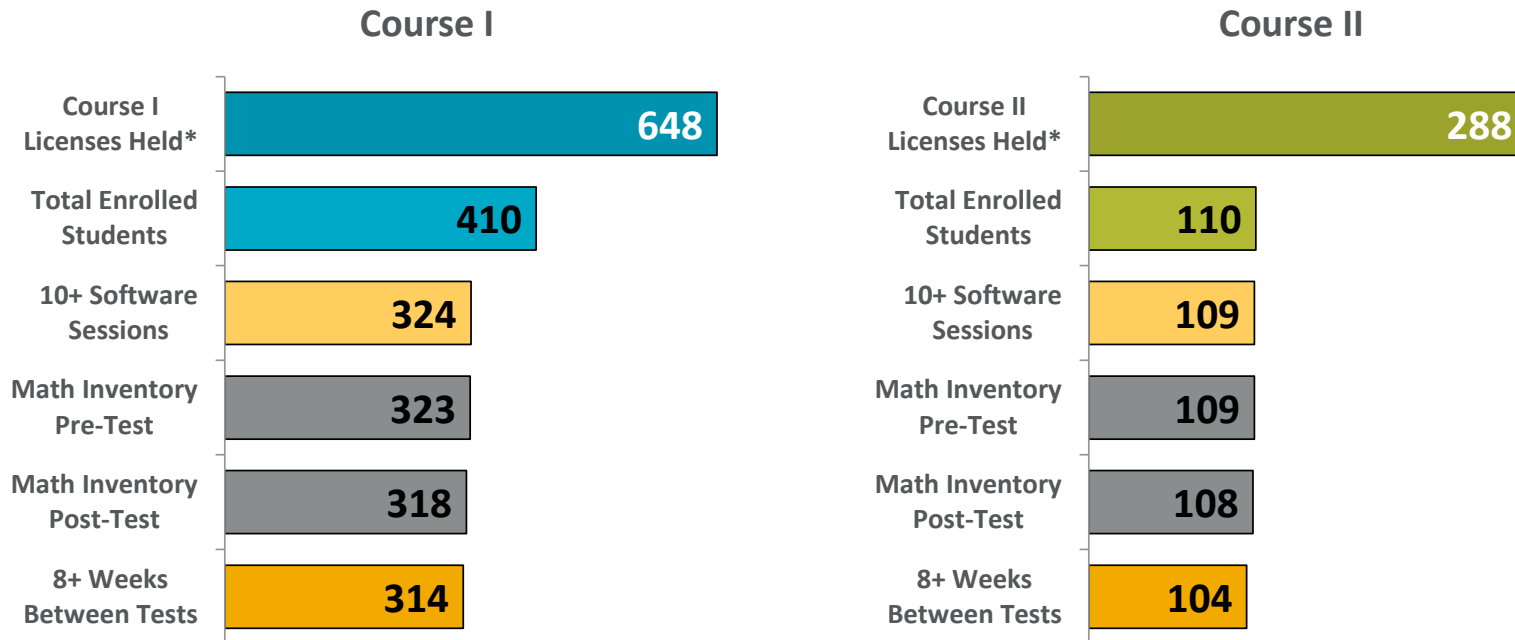
In partnership with the district, Houghton Mifflin Harcourt has analyzed data from five sites that have implemented the *MATH 180* Course I and *MATH 180* Course II intervention programs.

Preliminary Analysis Observations

- **For *MATH 180* Course I**
 - 324 of 410 enrolled students (**79%**) had 10+ sessions of software use.
 - 314 of 410 enrolled students (**77%**) had 10+ sessions of software use and have completed two *Math Inventory* test administrations at least eight weeks apart. These students had an average Quantile gain of 122.
- **For *MATH 180* Course II**
 - 109 of 110 enrolled students (**99%**) had 10+ sessions of software use.
 - 104 of 110 enrolled students (**95%**) had 10+ sessions of software use and have completed two *Math Inventory* test administrations at least eight weeks apart. These students had an average Quantile gain of 77.

MATH 180 Licenses and Gains Criteria

How many students had sufficient data for analysis?

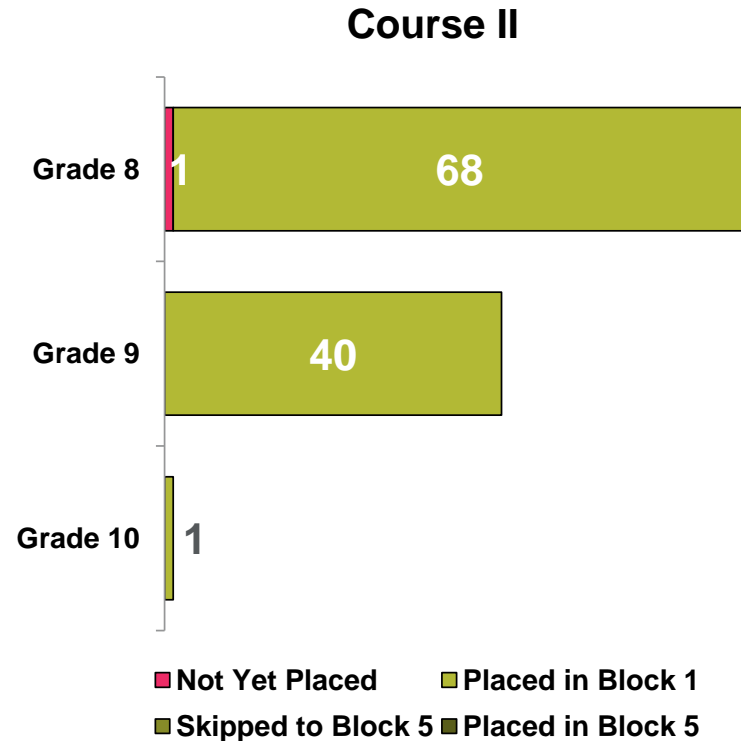
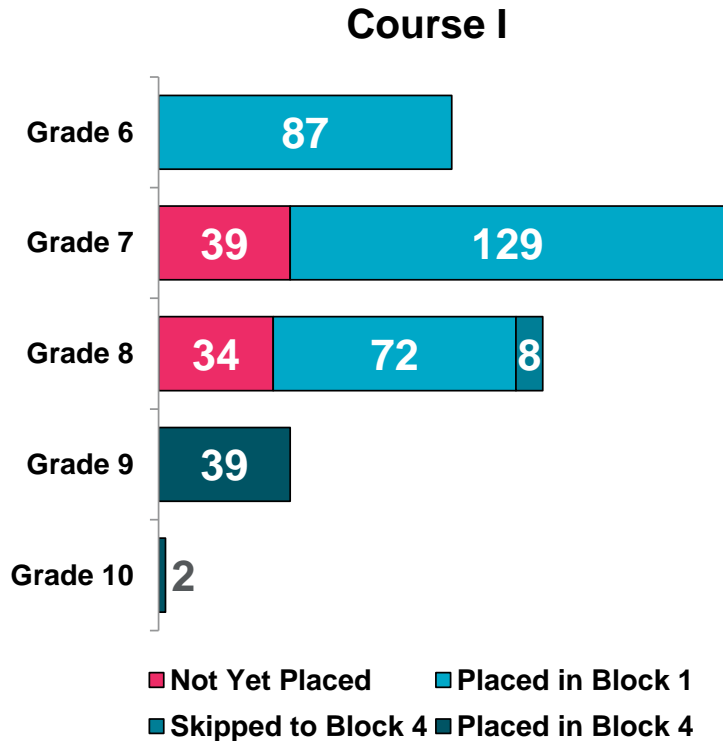


MATH 180 gains inclusion criteria result in two subsets of students:

- Progress and Mastery analyses are based on students with 10+ software sessions (tan bar).
- Quantile growth analyses are based on students with 10+ software sessions and two *Math Inventory* tests administered 8+ weeks apart (gold bar).

* License counts are taken from SAM Connect as the Gains Analysis is being produced, and might not reflect recent changes.

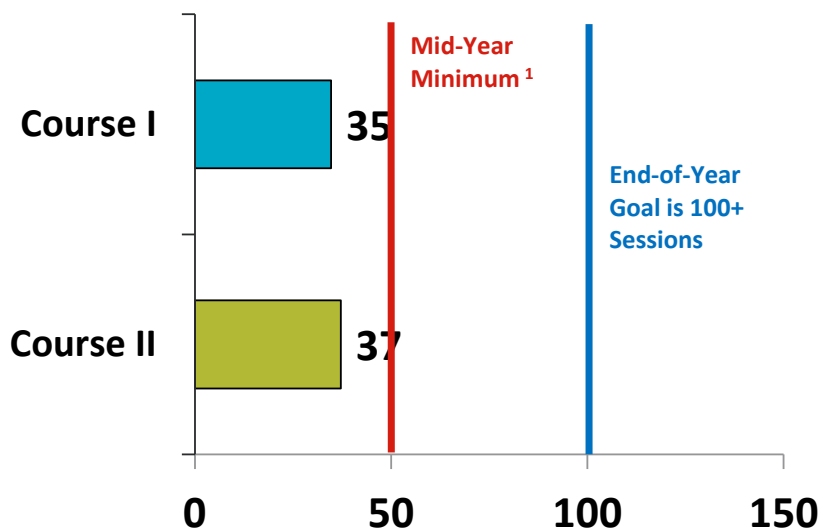
Block Placement by Grade for Both Programs



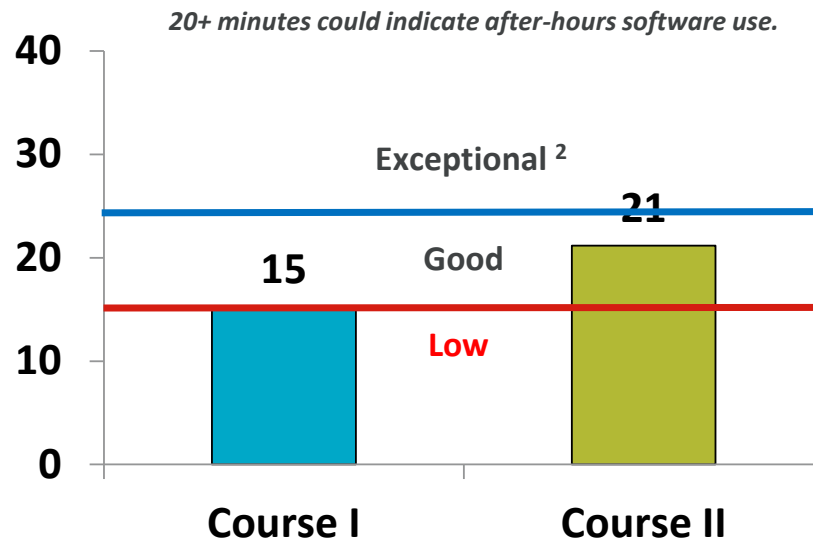
MATH 180 students can be initially placed in a later Block (Block 4 for Course I, Block 5 for Course II) if their skills are sufficient, or can be skipped to that later Block if they demonstrate mastery of content in early Blocks.

MATH 180 Course I & Course II Summary Usage

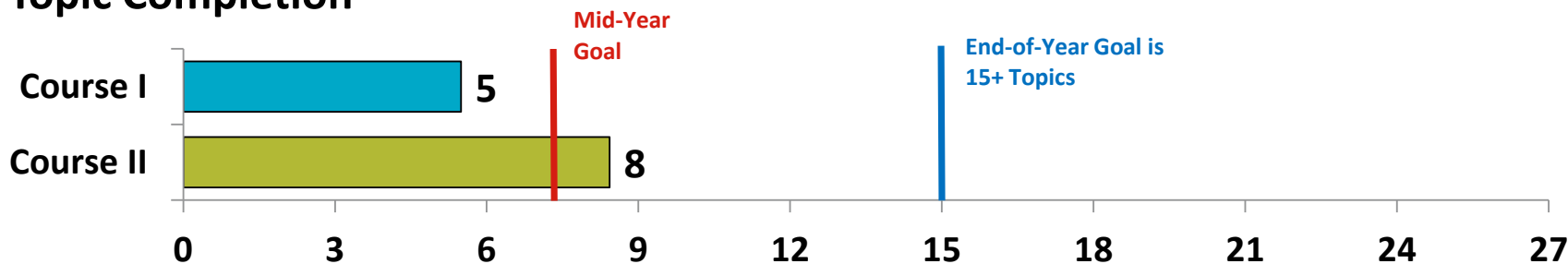
Software Sessions



Minutes Per Session



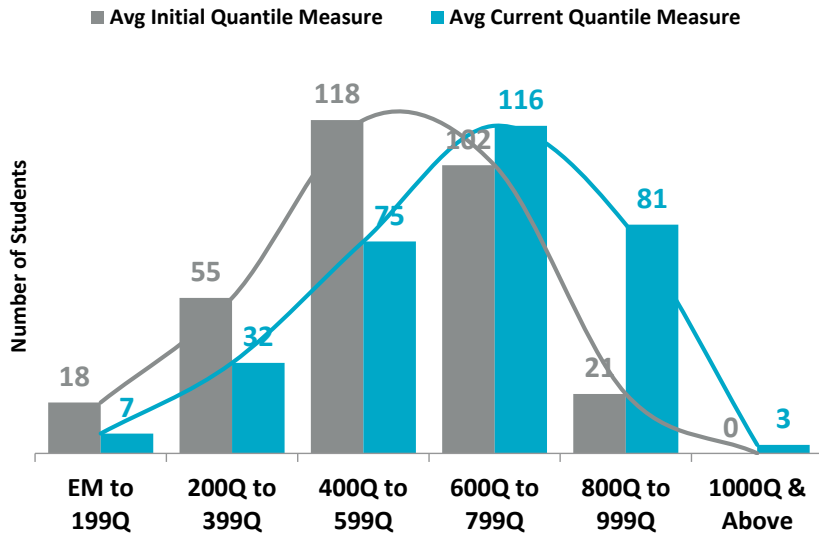
Topic Completion



- Assumes that *MATH 180 Course I* and *MATH 180 Course II* are implemented five days per week with full-rotational model in place each day and that implementation began no later than October.
- Extra session time after hours is beneficial, but long sessions in class could mean that instructional time is limited.

Students by Initial and Current Quantile

Movement on 200-Quantile Bands for *MATH 180* Course I Students



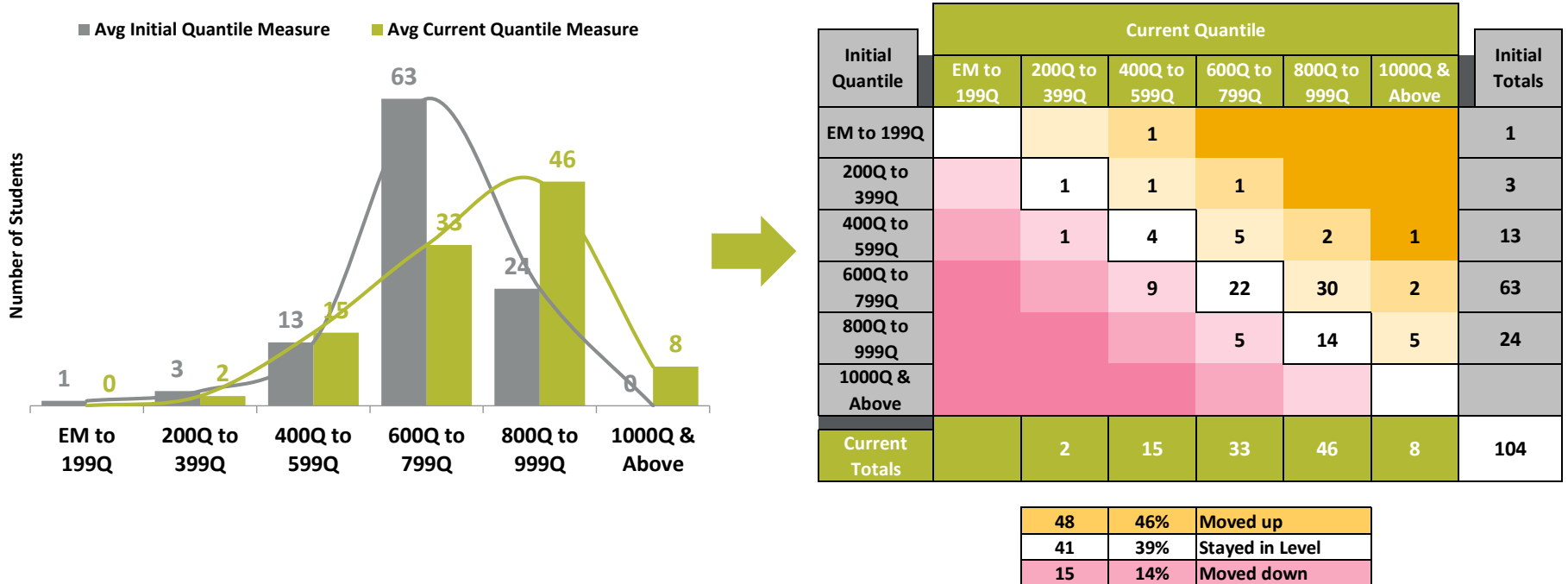
Initial Quantile	Current Quantile						Initial Totals
	EM to 199Q	200Q to 399Q	400Q to 599Q	600Q to 799Q	800Q to 999Q	1000Q & Above	
EM to 199Q	4	5	6	2	1		18
200Q to 399Q	1	10	24	17	3		55
400Q to 599Q	1	11	31	55	20		118
600Q to 799Q	1	6	14	38	41	2	102
800Q to 999Q				4	16	1	21
1000Q & Above							
Current Totals	7	32	75	116	81	3	314

177	56%	Moved up
99	32%	Stayed in Level
38	12%	Moved down

This shows how students in the Gains sample progressed from their initial Quantile bands (gray) to their current Quantile bands (blue).

Students by Initial and Current Quantile

Movement on 200-Quantile Bands for *MATH 180* Course II Students



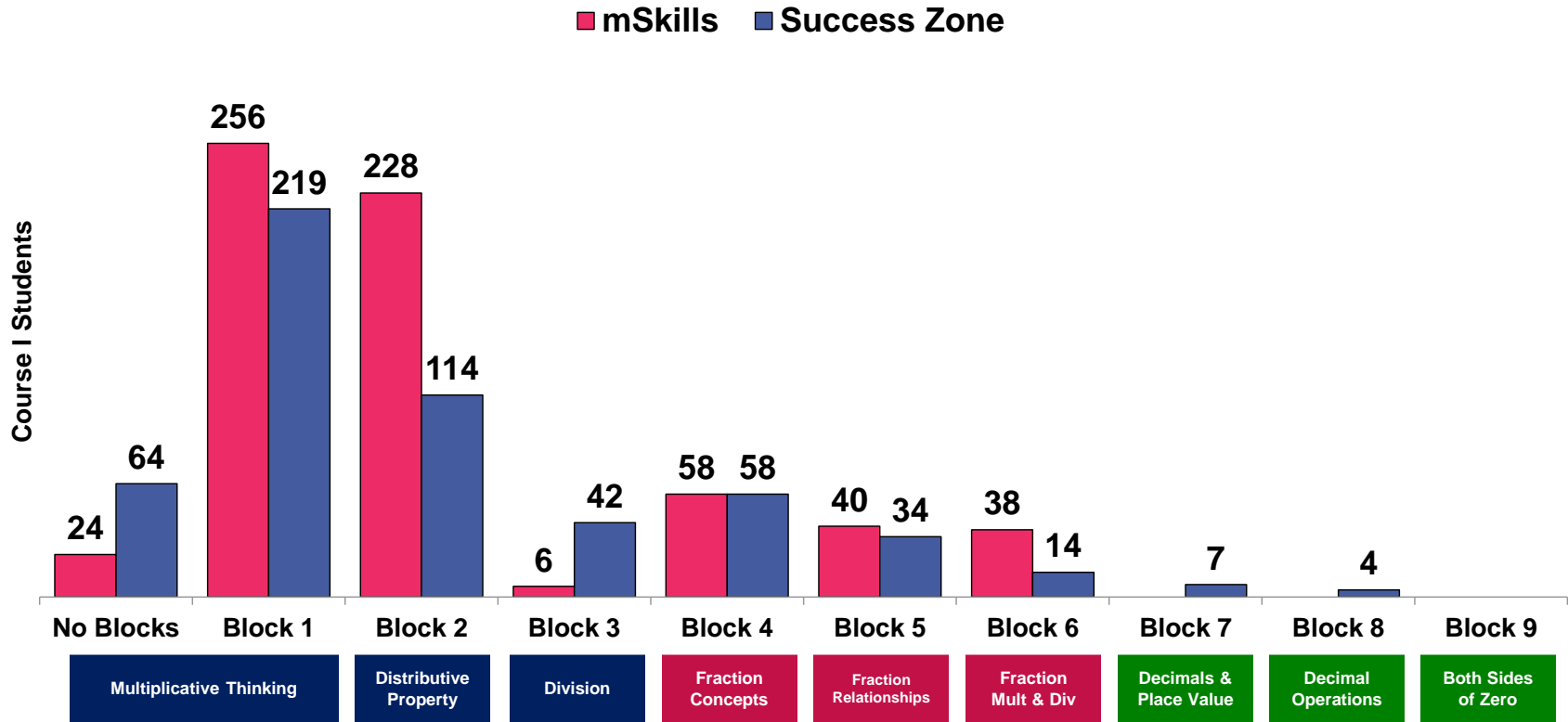
This shows how students in the Gains sample progressed from their initial Quantile bands (gray) to their current Quantile bands (green).

***MATH 180* Course I**

Usage and Growth Reports

Total Students by *MATH 180* Course I Block

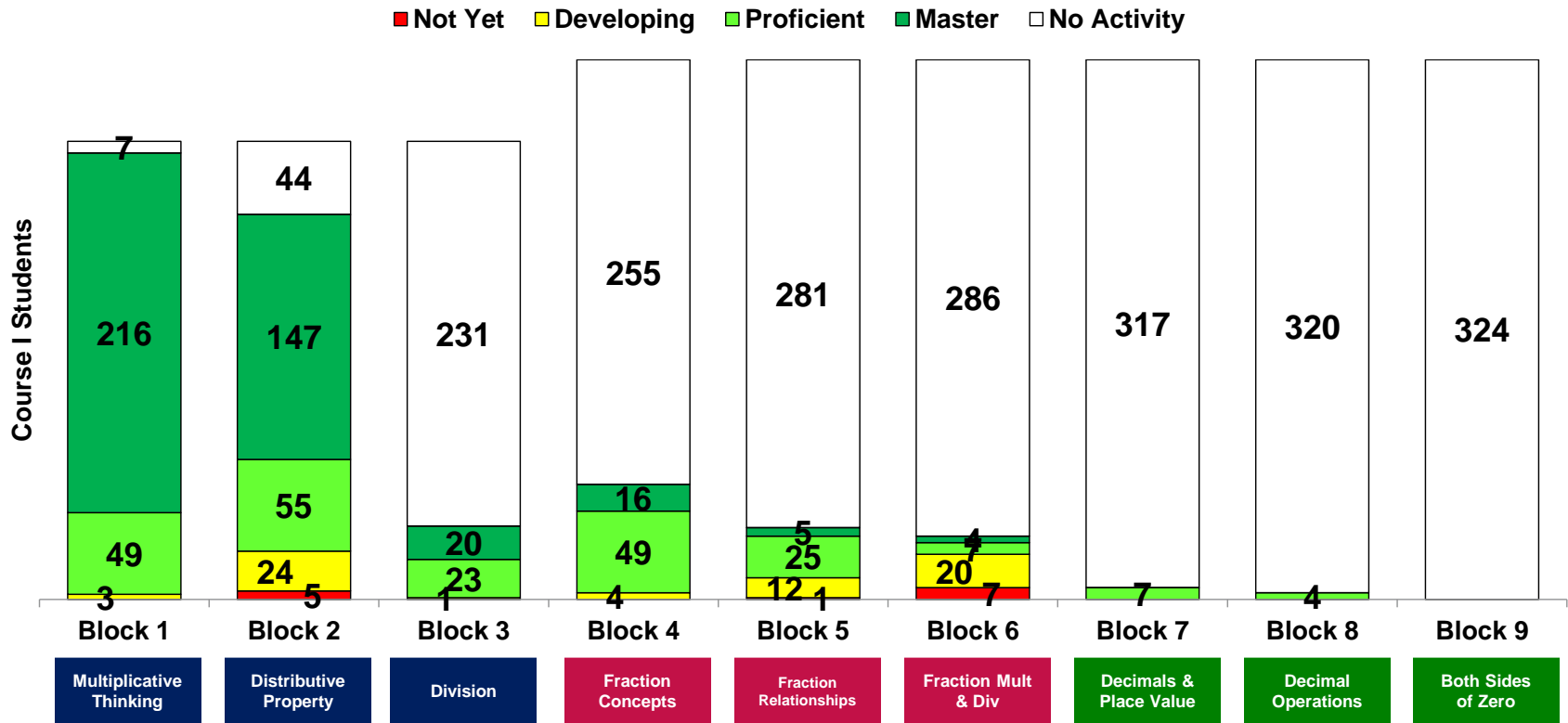
MATH 180 Course I Success Zone and mSkills Test Progress as Measures of Learning



- Reflects 324 students in *MATH 180* Course I with 10+ software sessions in the 2016–2017 school year.
- Since students may need to use *MATH 180* Course I for two years, the metrics above show cumulative progress, which may include work from a previous school year.
- To complete the Success Zone for a Block, a student must finish the Block’s Learn Zone software activities and the Success Zone formative assessments for each of the Block’s three Topics.
- A student takes the mSkills summative assessment after classroom instruction for the Block, and may score higher after having also completed the block’s Success Zone tests.

Total Students by *MATH 180* Course I Block

MATH 180 Course I Overall Performance



- Above shows students' Overall Performance by Block for *MATH 180* Course I.
- Reflects 324 students in *MATH 180* Course I with 10+ software sessions in the 2016–2017 school year.
- Eight students were promoted to Block 4 after completing some Topics within Blocks 1–3; 41 students started in Block 4.

MATH 180 Course I Usage & Growth Metrics

School	MATH 180 Course I Students	Grade Range	Mean mSkills Tests	MATH 180 Course I Software Usage				
				Mean Sessions & [MAX]	Mean Sessions per Week	Mean Minutes per Session	Mean Completed Topics	Mean Current Topic
Nathan Hale Middle School	8	Gr. 7	2	40 [52]	2.5	17	10	11
Norwalk High School	41	9 to 10	3	53 [69]	3.1	22	8	18
Ponus Ridge Middle School	111	6 to 8	2	32 [46]	1.9	13	5	6
Roton Middle School	35	6 to 8	2	44 [66]	2.6	14	7	10
West Rocks Middle School	129	6 to 8	2	28 [58]	2.1	15	5	6
MATH 180 Course I Software Gains Totals	324	6 to 10	2	35 [69]	2.2	15	5	8

MATH 180 Course I Quantile Growth Metrics				
Students With Quantile Results*	Mean Initial Quantile Measure	Mean Current Quantile Measure	Mean Quantile Change	Percent of Students to Gain 100Q+
7	706	706	0	14%
38	534	512	-22	34%
106	619	713	95	43%
35	449	685	237	86%
128	463	627	164	67%
314	528	651	122	56%

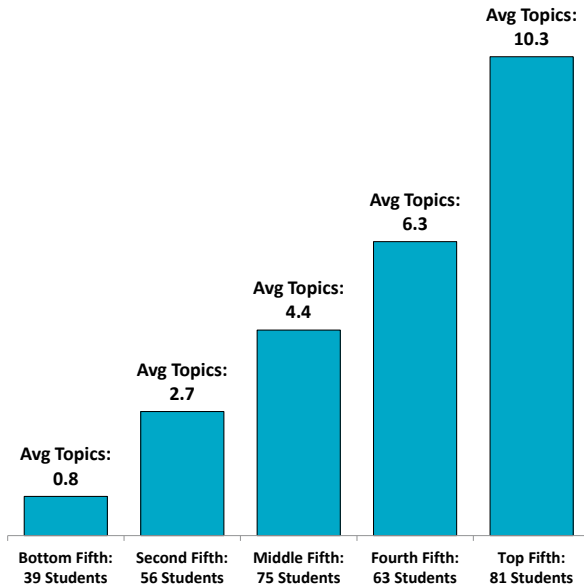
* Metrics on software use include all students with at least 10 software sessions; Quantile metrics include students with 10+ software sessions and *Math Inventory* tests at least eight weeks apart.

- Strongest results are typically achieved when students follow the *MATH 180* Instructional Model daily, and when care is taken to ensure a positive testing environment.
- Recommended daily Brain Arcade time is 10 to 15 minutes.
- Completed Topics indicates students' work completed on software.
- Teachers should give mSkills tests after the classroom instruction for each Block.

Average Quantile Gains by Topics Completed

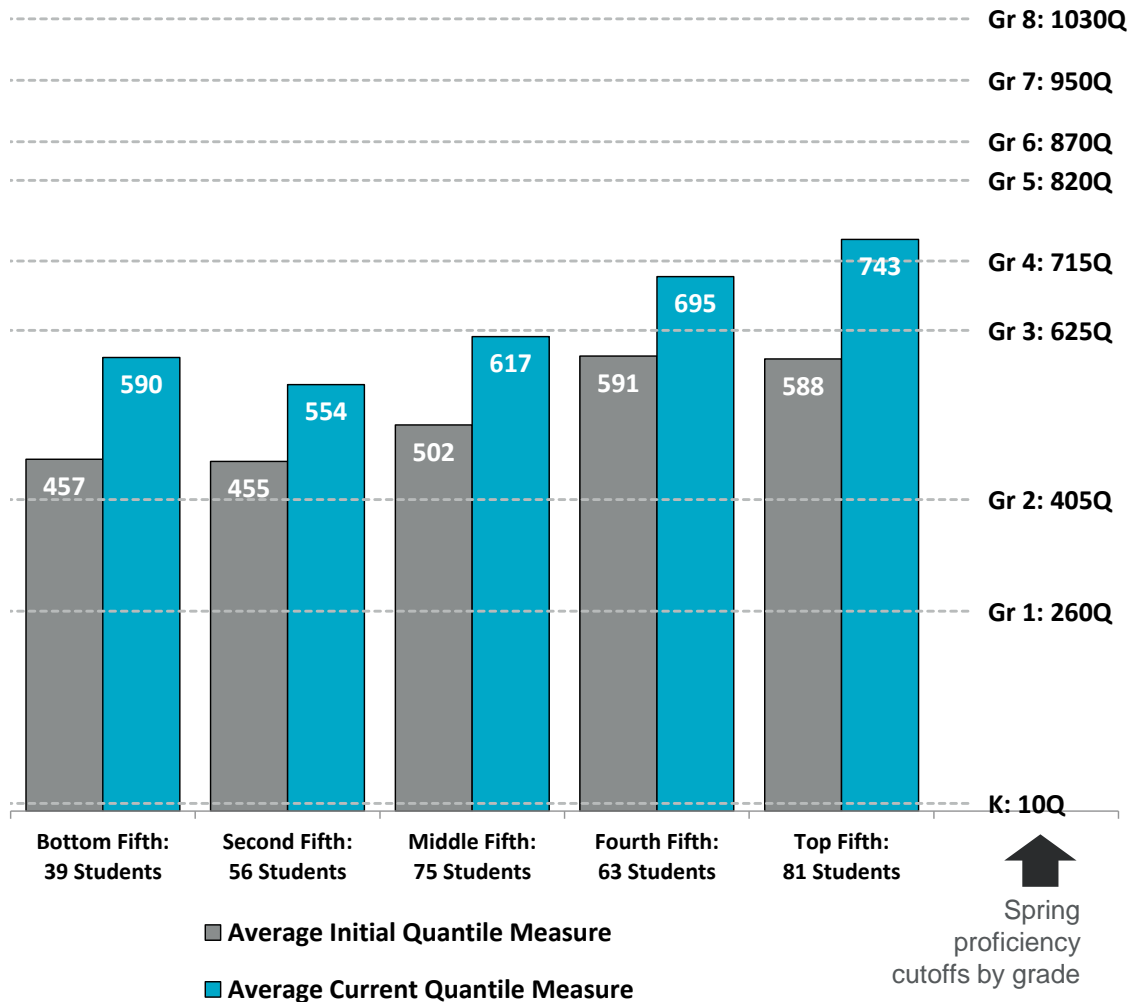
Gains and Usage Levels for *MATH 180* Course I Students

Topic Completion Groups



These charts partition students into five groups of approximately equal size, by their number of completed topics.

Research shows that students get the most benefit when making consistent use of *MATH 180* software.

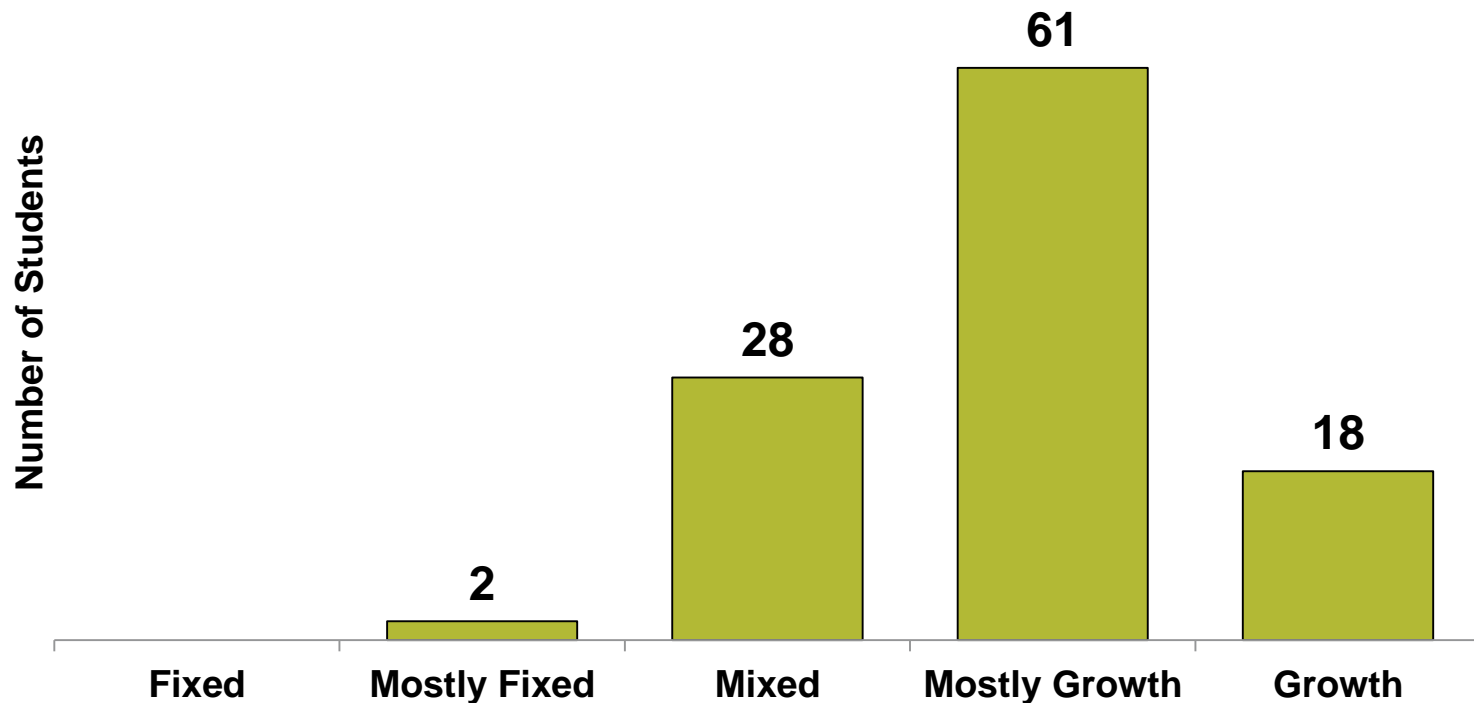


***MATH 180* Course II**

Usage and Growth Reports

Initial Growth Mindset Results

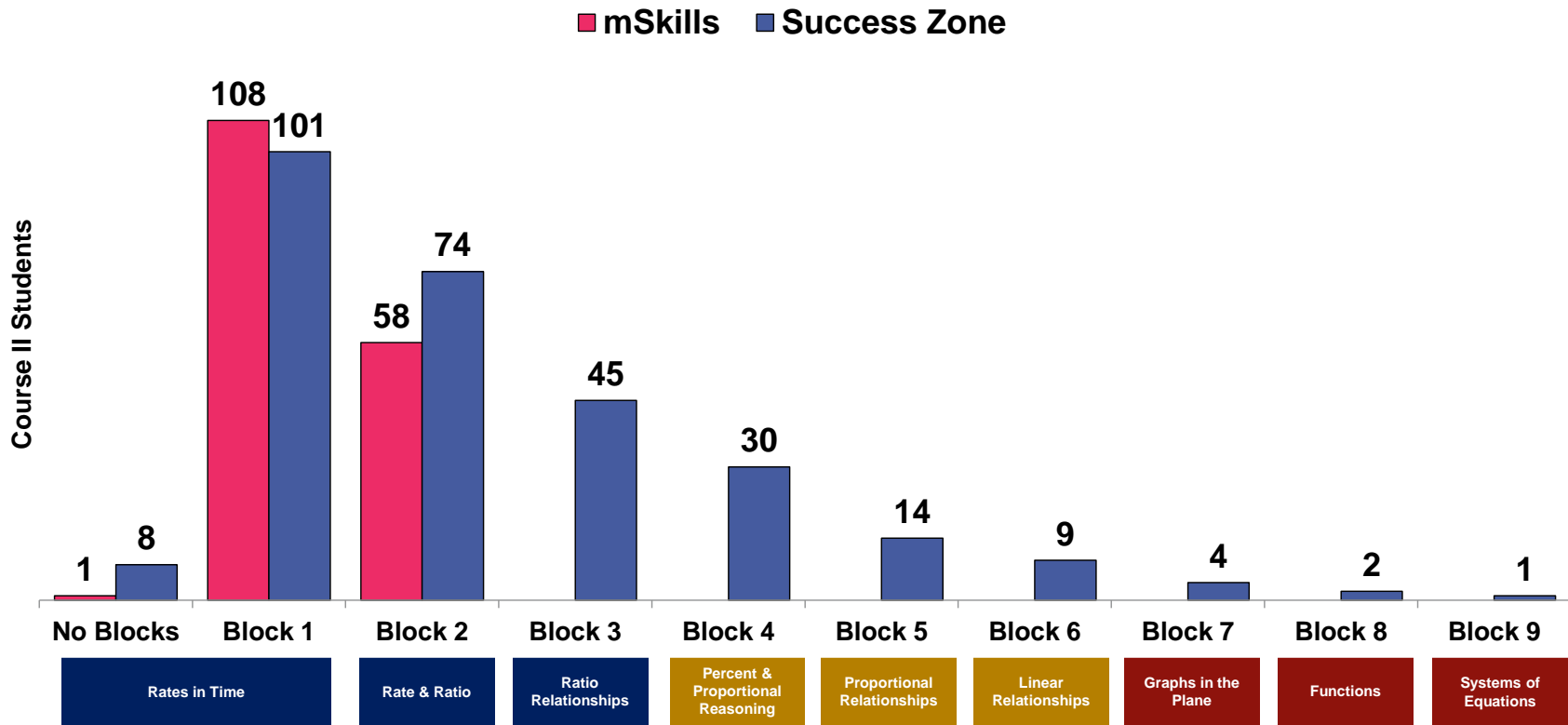
For Students Using *MATH 180* Course II



Students determine their Mindset Profile by taking a Mindset Scan at the start of Course II. The profiles reflect to what extent the students believe that intelligence and talent can be developed through dedication and hard work.

Total Students by *MATH 180* Course II Block

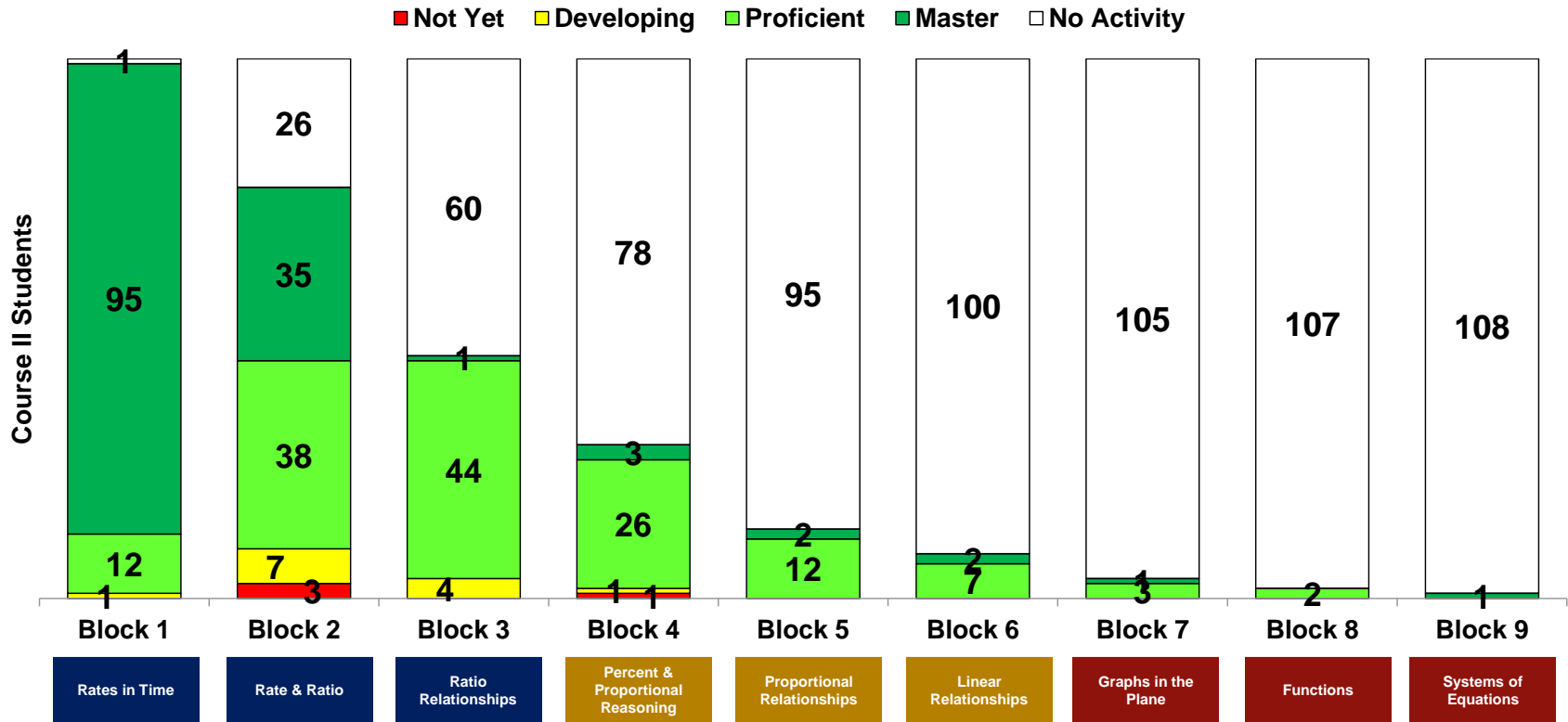
MATH 180 Course II Success Zone and mSkills Test Progress as Measures of Learning



- Reflects 109 students in *MATH 180* Course II with 10+ software sessions in the 2016–2017 school year.
- Since students may need to use *MATH 180* Course II for two years, the metrics above show cumulative progress, which may include work from a previous school year.
- To complete the Success Zone for a Block, a student must finish the Block’s Learn Zone software activities and the Success Zone formative assessments for each of the Block’s three Topics.
- A student takes the mSkills summative assessment after classroom instruction for the Block, and may score higher after having also completed the block’s Success Zone tests.

Total Students by *MATH 180* Course II Block

MATH 180 Course II Overall Performance



- Above indicates students' Overall Performance by Block for *MATH 180* Course II.
- Reflects 109 students in *MATH 180* Course II with 10+ software sessions in the 2016–2017 school year.

MATH 180 Course II Usage & Growth Metrics

School	MATH 180 Course II Students	Grade Range	Mean mSkills Tests	MATH 180 Course II Software Usage					MATH 180 Course II Quantile Growth Metrics				
				Mean Sessions & [MAX]	Mean Sessions per Week	Mean Minutes per Session	Mean Completed Topics	Mean Current Topic	Students With Quantile Results*	Mean Initial Quantile Measure	Mean Current Quantile Measure	Mean Quantile Change	Percent of Students to Gain 100Q+
Nathan Hale Middle School	29	Gr. 8	2	46 [58]	2.9	24	14	15	28	778	865	87	54%
Norwalk High School	41	9 to 10	2	40 [53]	2.6	25	8	9	39	623	716	93	51%
Ponus Ridge Middle School	31	Gr. 8	1	24 [28]	1.9	15	4	5	29	726	776	50	31%
Roton Middle School	8	Gr. 8	1	41 [50]	2.7	17	7	8	8	698	768	69	25%
MATH 180 Course II Software Gains Totals	109	8 to 10	2	37 [58]	2.5	21	8	9	104	699	777	77	44%

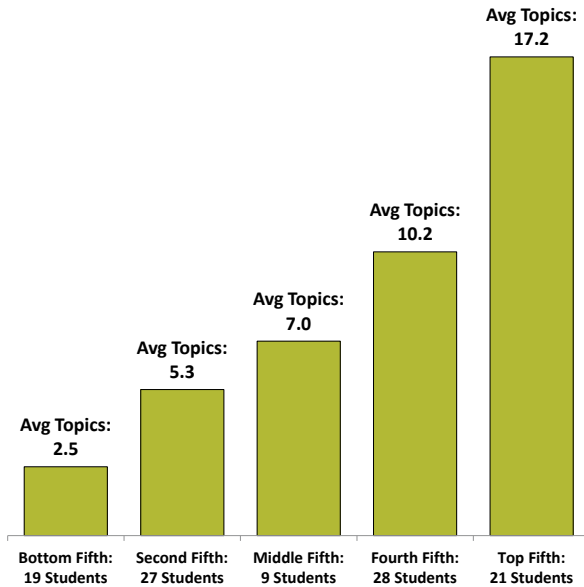
* Metrics on software use include all students with at least 10 software sessions; Quantile metrics include students with 10+ software sessions and *Math Inventory* tests at least eight weeks apart.

- Strongest results are typically achieved when students follow the *MATH 180* Instructional Model daily, and when care is taken to ensure a positive testing environment.
- Recommended daily Brain Arcade time is 10 to 15 minutes.
- Completed Topics indicates students' work completed on software.
- Teachers should give mSkills tests after the classroom instruction for each Block.

Average Quantile Gains by Topics Completed

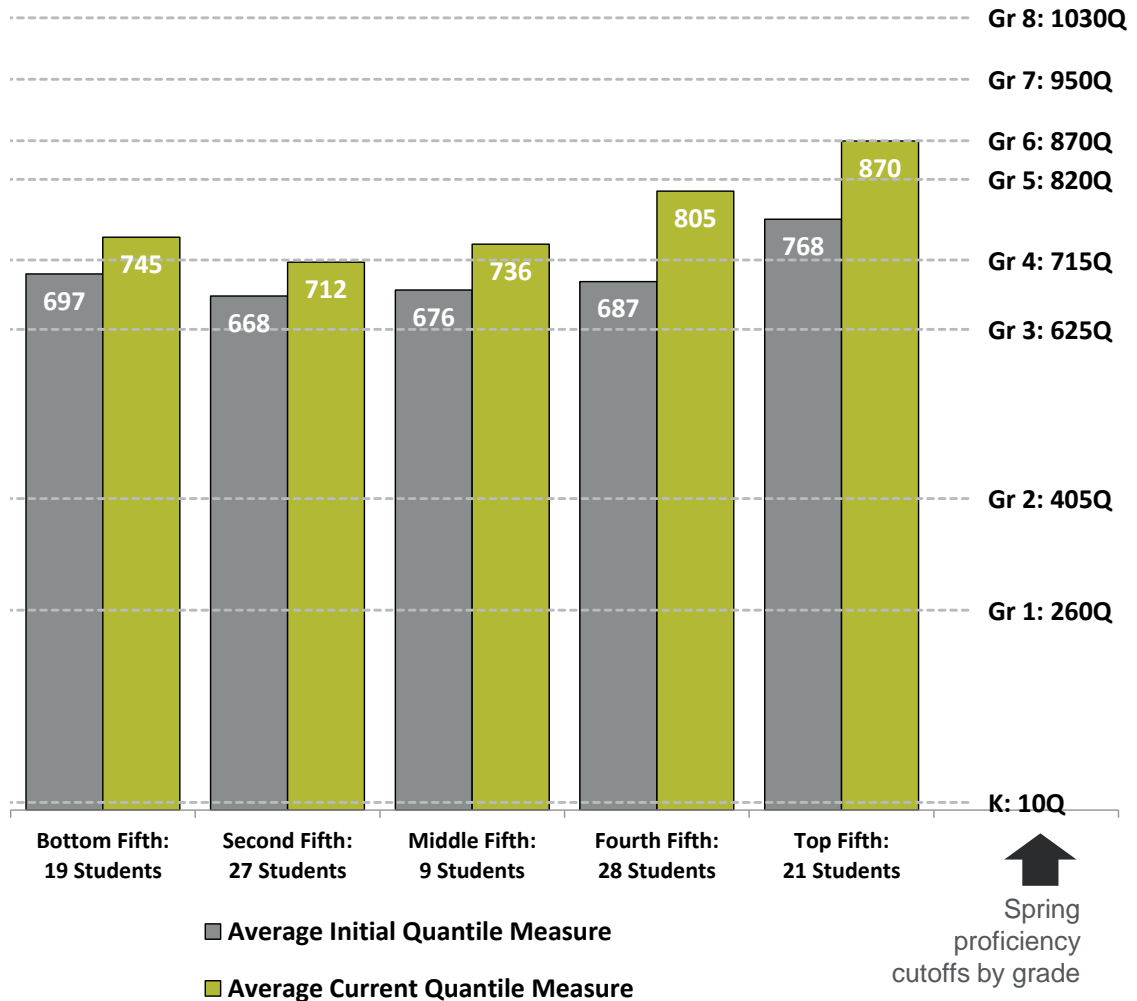
Gains and Usage Levels for *MATH 180* Course II Students

Topic Completion Groups



These charts partition students into five groups of approximately equal size, by their number of completed topics.

Research shows that students get the most benefit when making consistent use of *MATH 180* software.



Student Placement

MATH 180 Course I

MATH 180 Course II

Quantile[®] Measures and Student Placement

How Do Students' Quantile Measures Reflect *MATH 180* Need?

Quantile Measure	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10 & Up
1100Q to 1145Q						G9=1140Q
1050Q to 1095Q						
1000Q to 1045Q					G8=1030Q	
950Q to 995Q				G7=950Q		
900Q to 945Q						
850Q to 895Q			G6=870Q			
800Q to 845Q		G5=820Q				
750Q to 795Q						
700Q to 745Q	G4=715Q			Candidate for <i>MATH 180</i> Course II		
650Q to 695Q						
600Q to 645Q						
550Q to 595Q		Optional <i>Block 4</i> Promotion				
500Q to 545Q						
450Q to 495Q						
400Q to 445Q						
350Q to 395Q						
300Q to 345Q						
250Q to 295Q		<i>MATH 180</i> Course I				
200Q to 245Q						
150Q to 195Q						
100Q to 145Q	<i>Pre-multiplication Math Foundations Content</i>					
50Q to 95Q						
EM to 45Q						







- Students below 200Q (**the red range**) need Tier 3 math intervention.
- Students in **the blue range** are likely to benefit from *MATH 180* Course I.
- Students in **the purple range** are likely to benefit from *MATH 180* Course I, but may be ready to start in Block 4.
- Students in **the olive range** are likely to benefit from *MATH 180* Course II.
- Students in **the green range** are likely to benefit from *MATH 180* Course II, but may be ready to start in Block 5.
- Students in **the gold range** should be able to handle the core curriculum.
- The spring proficiency cutoff for the prior grade is marked for each column for reference.
- **Always use multiple measures when making student placement decisions.**

- In high school grades, place students according to need.

Quantile Measures and Student Placement

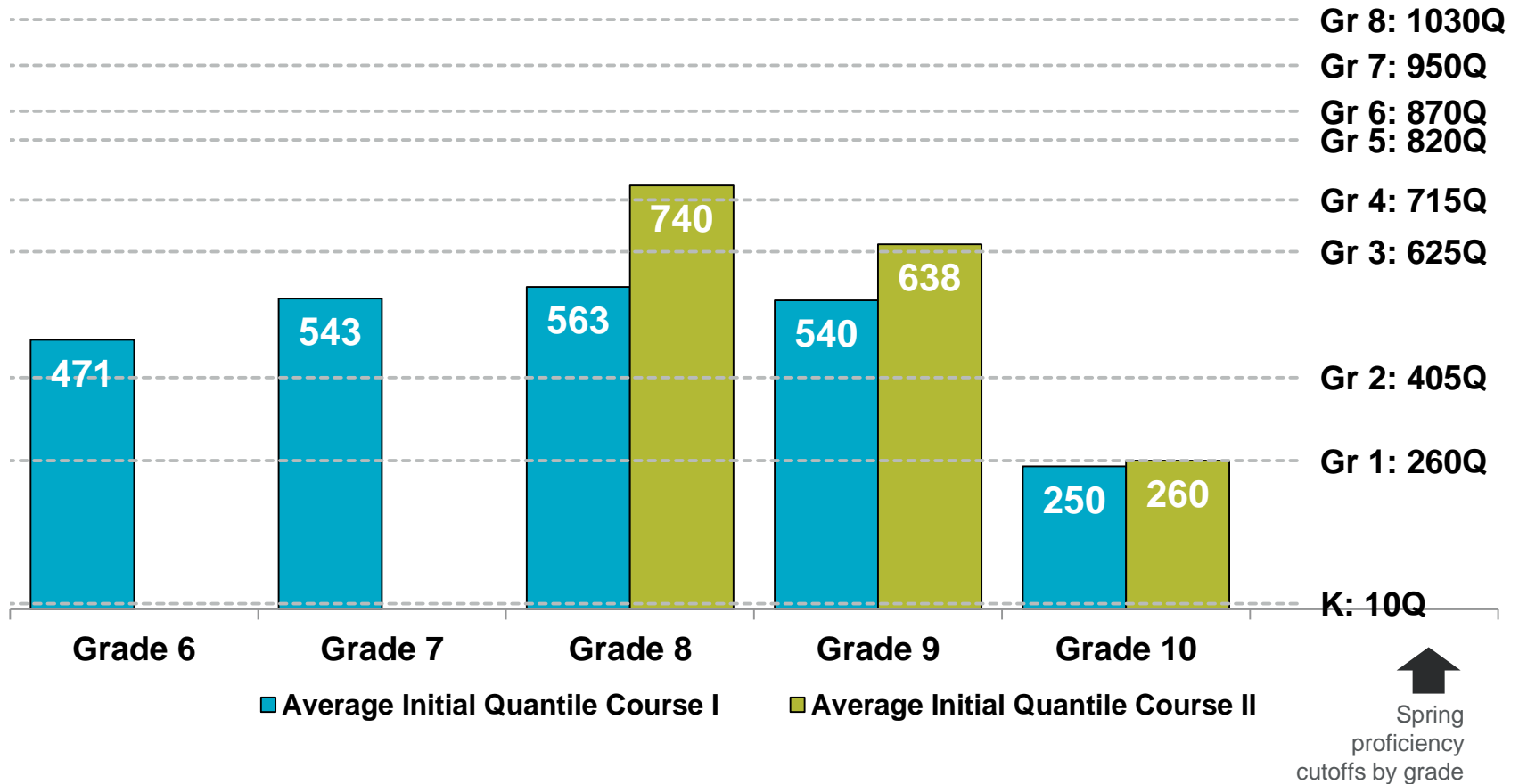
How Many Students Fall into Each 50Q Band?

Quantile Measure	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10 & Up
1100Q to 1145Q						
1050Q to 1095Q						
1000Q to 1045Q			1			
950Q to 995Q			2	5	1	
900Q to 945Q			6	11	1	
850Q to 895Q			11	11	4	
800Q to 845Q			8	13	1	
750Q to 795Q		3	19	26	3	
700Q to 745Q		5	12	24	8	
650Q to 695Q		6	19	17	10	
600Q to 645Q		13	12	8	14	
550Q to 595Q		7	11	18	7	
500Q to 545Q		8	9	12	8	
450Q to 495Q		9	7	9	9	
400Q to 445Q		9	11	7	4	1
350Q to 395Q		7	11	6	2	
300Q to 345Q		7	7	2	4	
250Q to 295Q		4	8	3		1
200Q to 245Q			4	2	1	
150Q to 195Q		1	3	1		
100Q to 145Q		2	1	2		
50Q to 95Q			1	1		1
EM to 45Q		5	4	2	1	

Recommendations Key	
	Core Math Instruction
	MATH 180 Course II (Block 5)
	MATH 180 Course II (Block 1)
	MATH 180 Course I (Block 4)
	MATH 180 Course I (Block 1)
	Tier 3 Intervention

- Above reflects this year's initial *Math Inventory* test for each student enrolled in *MATH 180*.
- Always use multiple measures to determine appropriate student placement.

Average Initial Quantile Measures by Grade



See previous slides for placement recommendations by Quantile measure and grade.

Placement Fidelity, Usage, and Gains

How Actual Placement and Recommended Placement Relate to Progress

The top chart shows how actual placement (gray) aligns with recommended placement (gold). The table at bottom shows how usage and Quantile gains correlate to placement fidelity.

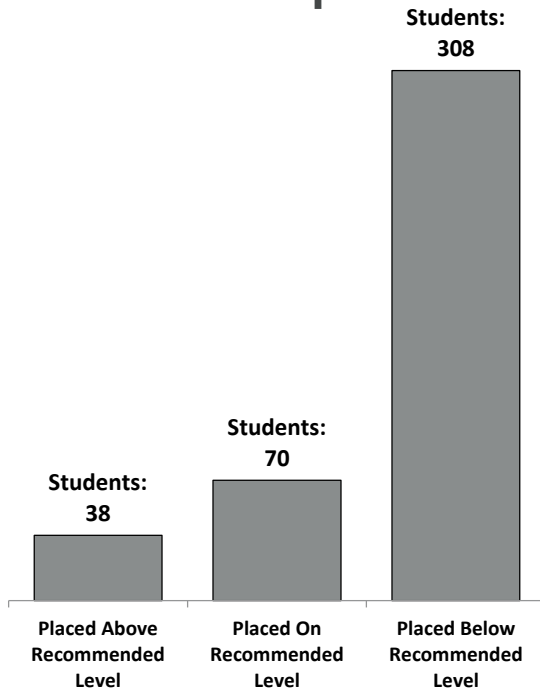
Actual Placement	Recommended Placement						Actual Totals
	Core Math	MATH 180 Course II Block 5	MATH 180 Course II Block 1	MATH 180 Course I Block 4	MATH 180 Course I Block 1	Tier 3 Intervention	
MATH 180 Course II Block 5							
MATH 180 Course II Block 1	54	24	19	15	3		115
MATH 180 Course I Block 4	5	4	6	14	13	3	45
MATH 180 Course I Block 1	114	14	20	67	37	4	256
Recommended Totals	173	42	45	96	53	7	416

Always use multiple measures to determine appropriate student placement.

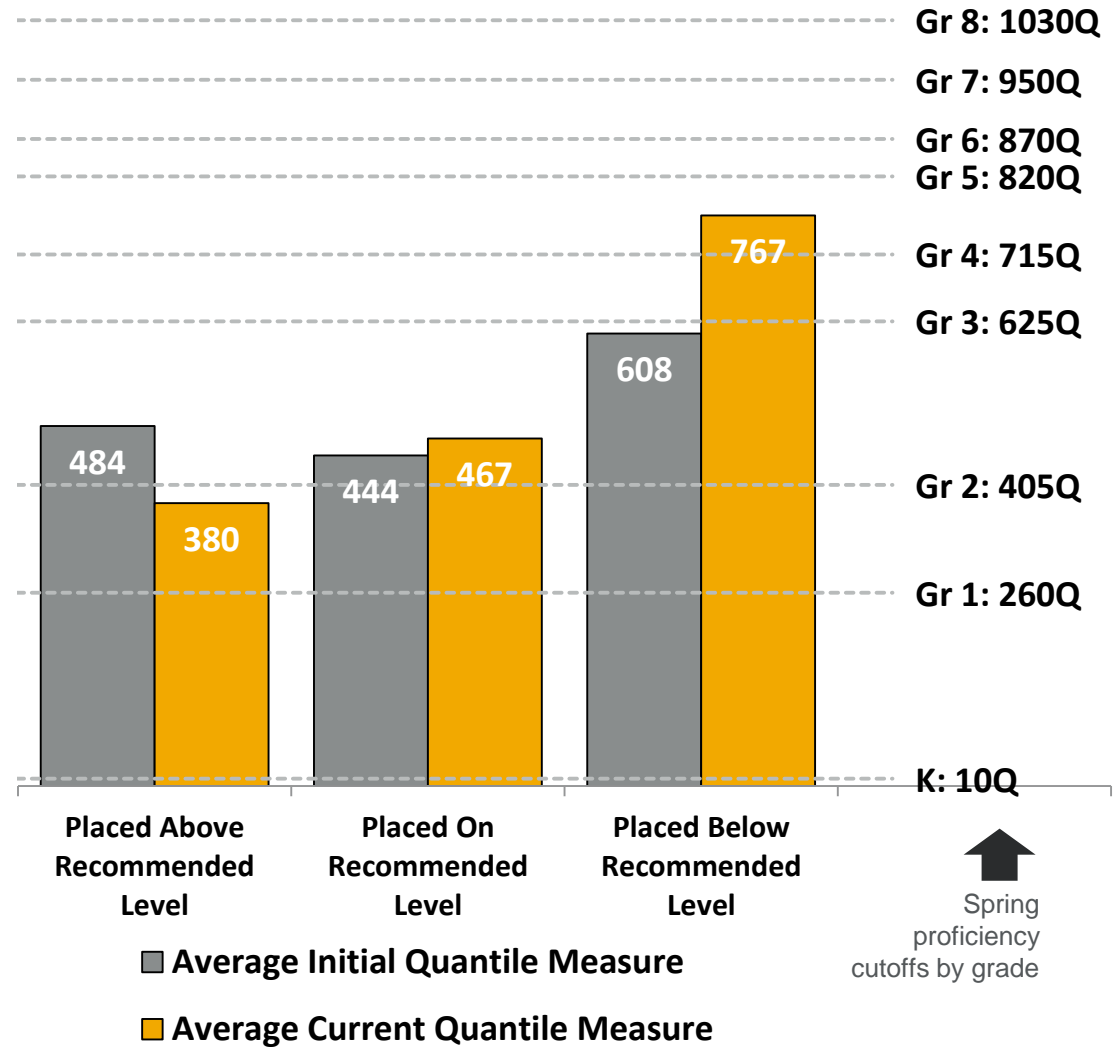
Placement	MATH 180 Students	Mean Software Sessions	Mean Topics Completed	Mean Change in Quantile
Above Recommended Level	38	41	6	-104
On Recommended Level	70	33	4	23
Below Recommended Level	308	38	7	159
MATH 180 Totals	416	37	7	112

Average Quantile Gains by Placement Fidelity

Gains and Proper Placement for *MATH 180* Students



This compares Gains made by students placed below the recommended intervention level, students placed on the recommended level, and students placed above the recommended level.



Appendix

MATH 180 Background and
Supplemental Reports

Math Inventory Test Durations

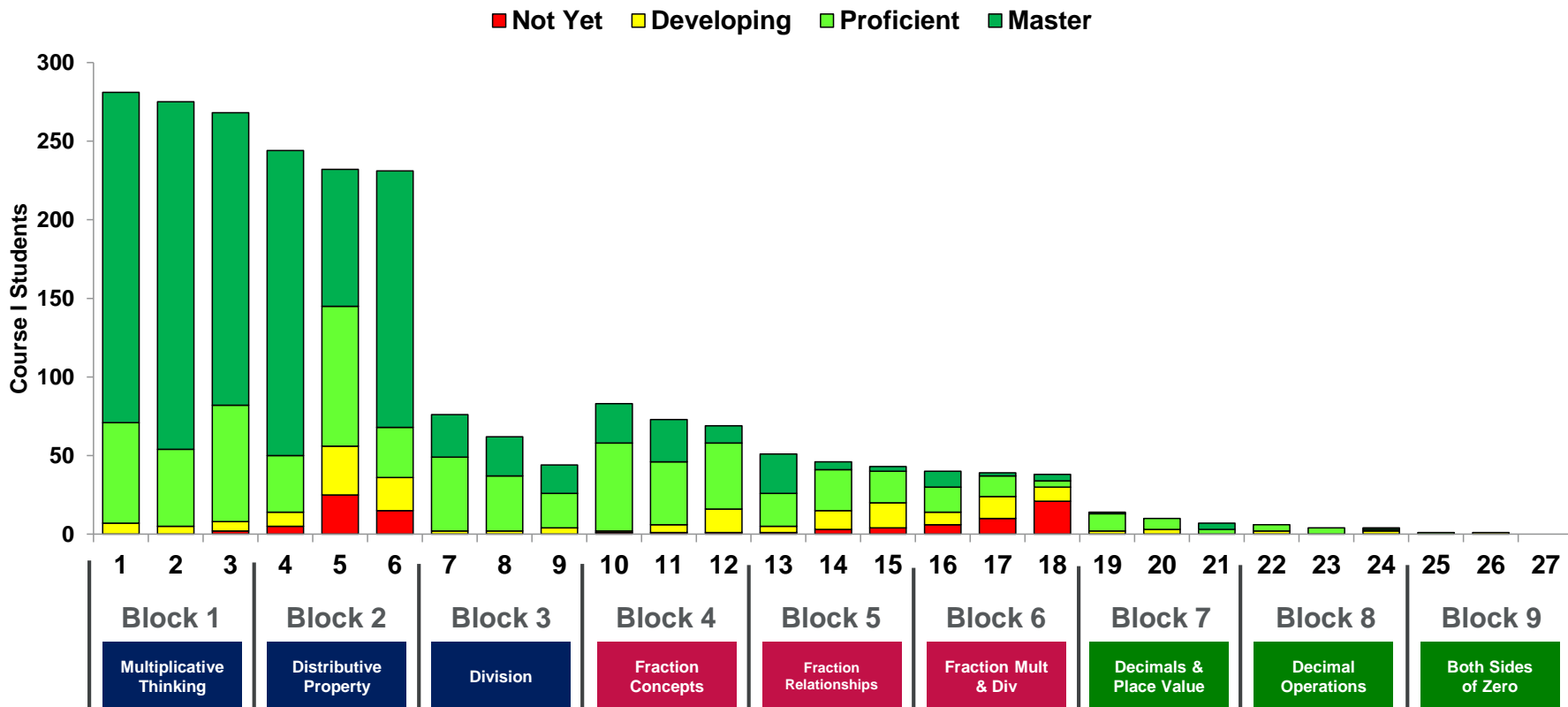
How Often Did Students Take *Math Inventory* Tests in Less Than 15 Minutes?

School	MATH 180 Students	First Test \geq 15 Minutes; Last Test \geq 15 Minutes	First Test < 15 Minutes; Last Test \geq 15 Minutes	First Test \geq 15 Minutes; Last Test < 15 Minutes	First Test < 15 Minutes; Last Test < 15 Minutes
Nathan Hale Middle School	35	35			
Norwalk High School	77	75		2	
Ponus Ridge Middle School	133	133			
Roton Middle School	43	42			1
West Rocks Middle School	128	127	1		
District Totals	416	412	1	2	1

Students can often complete *Math Inventory* assessments more quickly as they gain fluency, but short test durations can indicate that students did not make their best efforts. Teachers are advised to check with students when they complete the *Math Inventory* in less than 15 minutes.

MATH 180 Course I Overall Performance

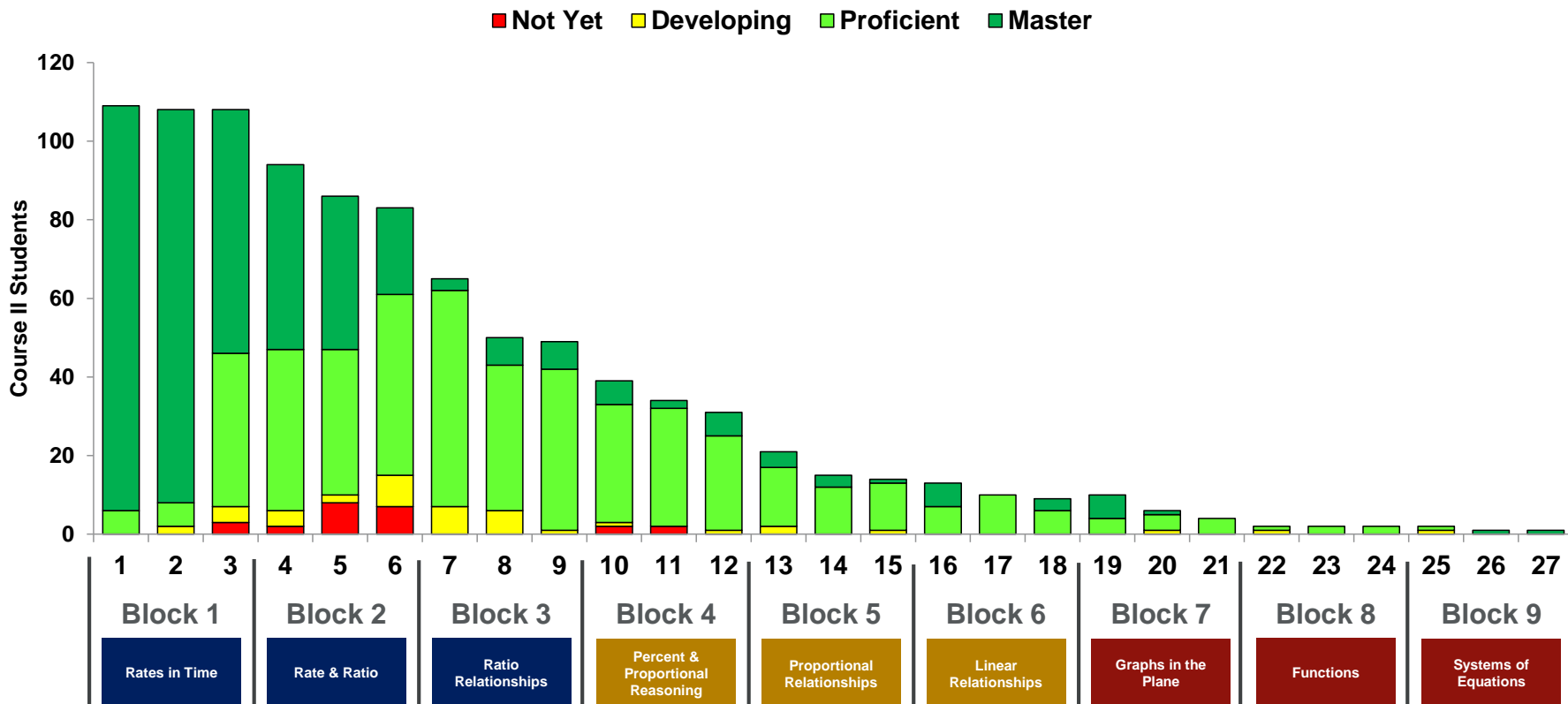
Total Students by Performance on Completed Topics and mSkills Tests



- Above data shows that students typically score Proficient or Master level in each completed Topic of the *MATH 180* Course I program.
- Overall Performance incorporates mSkills and Success Zone test scores as well as Learn Zone and Brain Arcade activity statistics into a single measure of student performance and ability.

MATH 180 Course II Overall Performance

Total Students by Performance on Completed Topics and mSkills Tests

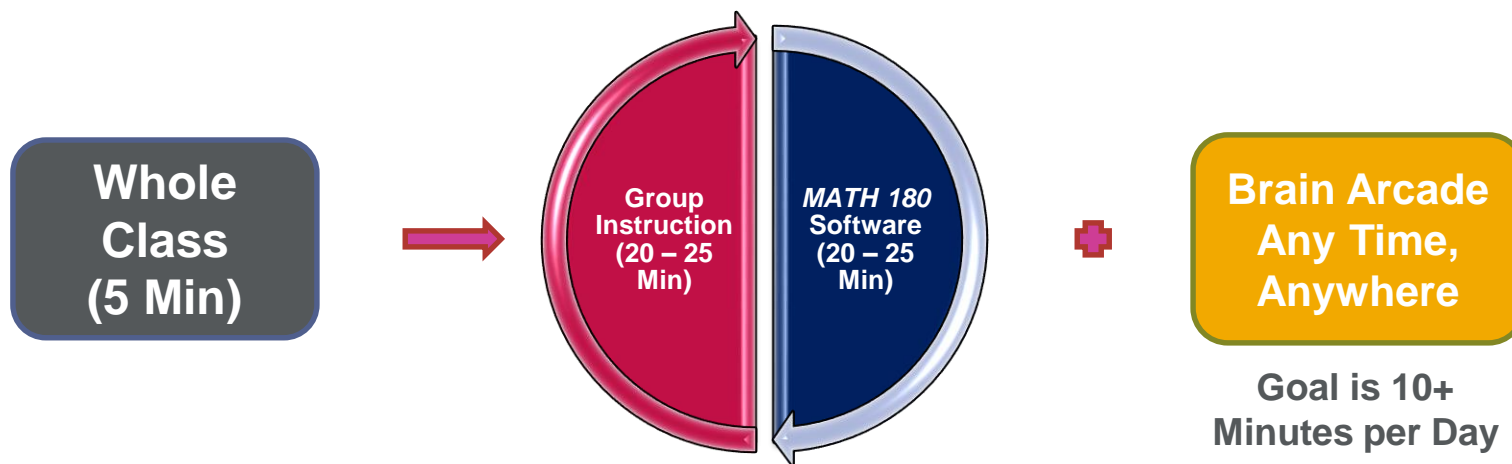


- Above data shows that students typically score Proficient or Master level in each completed Topic of the *MATH 180* Course II program.
- Overall Performance incorporates mSkills and Success Zone test scores as well as Learn Zone and Brain Arcade activity statistics into a single measure of student performance and ability.

MATH 180 Model and Usage Expectations

Set Realistic and Attainable Goals for Implementation

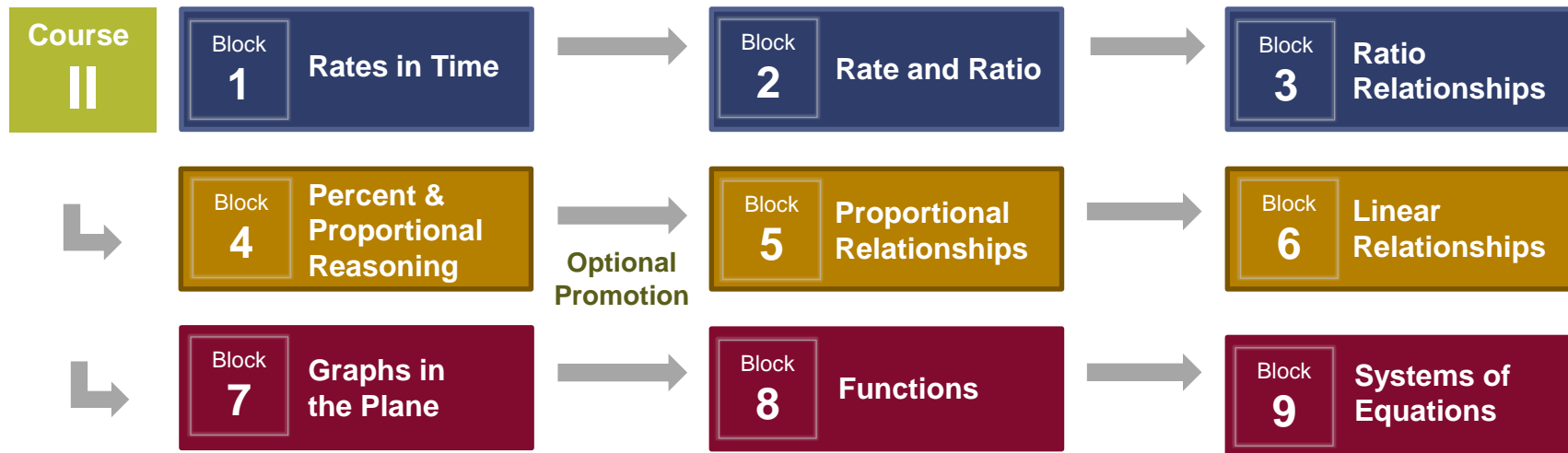
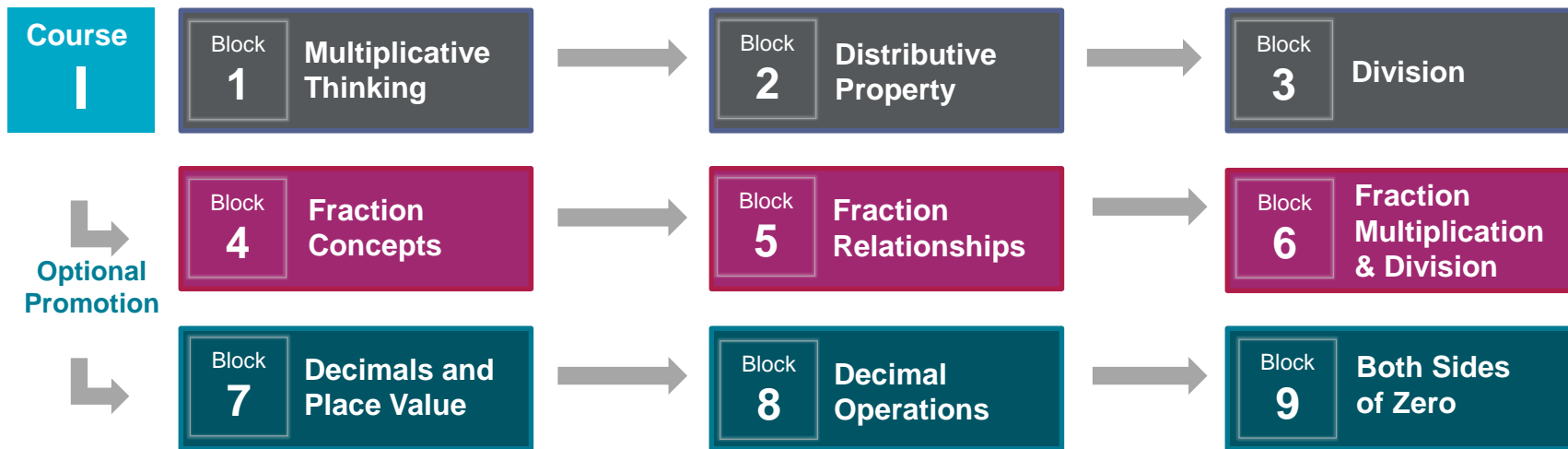
Metric	Mid-Year	End-of-Year
Sessions	50 +	100 +
Minutes per Session	16 & Up	16 & Up
Blocks [Software]	2 to 3	4 & Up
HMH Math Inventory Total Tests	2 or 3 Tests	3 to 5 Tests



Set a goal of 15–20 software sessions per month of implementation.

MATH 180 Content

Two Courses, Nine Blocks per Course, Three Topics per Block



College and Career Ready Quantile Measure Proficiency

Spring Targets for Performance Bands – What is Proficiency on July 15th ?

Grade	<i>Below Basic</i>	<i>Basic</i>	<i>Proficient</i>	<i>Advanced</i>
K	EM400Q – EM190Q	EM185Q – 5Q	10Q – 175Q	180Q & Above
1	EM400Q – 60Q	65Q – 255Q	260Q – 450Q	455Q & Above
2	EM400Q – 205Q	210Q – 400Q	405Q – 600Q	605Q & Above
3	EM400Q – 425Q	430Q – 620Q	625Q – 850Q	855Q & Above
4	EM400Q – 540Q	545Q – 710Q	715Q – 950Q	955Q & Above
5	EM400Q – 640Q	645Q – 815Q	820Q – 1020Q	1025Q & Above
6	EM400Q – 700Q	705Q – 865Q	870Q – 1125Q	1130Q & Above
7	EM400Q – 770Q	775Q – 945Q	950Q – 1175Q	1180Q & Above
8	EM400Q – 850Q	855Q – 1025Q	1030Q – 1255Q	1260Q & Above
9	EM400Q – 940Q	945Q – 1135Q	1140Q – 1325Q	1330Q & Above
10	EM400Q – 1020Q	1025Q – 1215Q	1220Q – 1375Q	1380Q & Above
11	EM400Q – 1150Q	1155Q – 1345Q	1350Q – 1425Q	1430Q & Above
12	EM400Q – 1190Q	1195Q – 1385Q	1390Q – 1505Q	1510Q & Above

As many states adopt more rigorous standards for content and assessment, HMH has partnered with MetaMetrics to determine what Quantile Measure performance would best prepare students to be college ready in the 21st century. *The Math Inventory* Quantile Measure performance bands above have been implemented as part of SAM and gains reports since Fall 2014.