



EFFECTS OF IMPLEMENTATION ACT COLLEGE AND CAREER READINESS STANDARDS

Presented by Derek Pertzborn



Presentation

1. General design and layout of our curriculum
2. Results
3. Curriculum and organizations
4. Questions and comments

Mission/Vision

- Why do we exist?
- Where do we want to go?

College and Career Readiness

What is College and Career Readiness in Math?

- What do we want our students to learn?
- How are we going to know students are learning?
- What are we going to do if students are not learning?
- What are we going to do if students already know the material?



What Do We Want Our Students to Learn?

- ACT College and Career Readiness Standards (Hand-out)
 - ACT has done extensive research on what students need to be able to do to be college and career ready.
 - ACT has organized these standards in a continuum of learning.
- Students are placed on the continuum according to their ability

College Readiness Standards — Mathematics			
Grade 8	Grade 9	Grade 10	Grade 11
<p>8-10 <i>Number and Quantity</i></p> <p>Understand the real number system and the operations with real numbers.</p>	<p>9-10 <i>Number and Quantity</i></p> <p>Understand the real number system and the operations with real numbers.</p>	<p>10-11 <i>Number and Quantity</i></p> <p>Understand the real number system and the operations with real numbers.</p>	<p>11-12 <i>Number and Quantity</i></p> <p>Understand the real number system and the operations with real numbers.</p>
<p>8-10 <i>Algebra</i></p> <p>Understand linear functions, systems of linear equations, and linear inequalities.</p>	<p>9-10 <i>Algebra</i></p> <p>Understand linear functions, systems of linear equations, and linear inequalities.</p>	<p>10-11 <i>Algebra</i></p> <p>Understand linear functions, systems of linear equations, and linear inequalities.</p>	<p>11-12 <i>Algebra</i></p> <p>Understand linear functions, systems of linear equations, and linear inequalities.</p>
<p>8-10 <i>Geometry</i></p> <p>Understand geometric figures and their properties.</p>	<p>9-10 <i>Geometry</i></p> <p>Understand geometric figures and their properties.</p>	<p>10-11 <i>Geometry</i></p> <p>Understand geometric figures and their properties.</p>	<p>11-12 <i>Geometry</i></p> <p>Understand geometric figures and their properties.</p>
<p>8-10 <i>Statistics and Probability</i></p> <p>Understand data analysis and probability.</p>	<p>9-10 <i>Statistics and Probability</i></p> <p>Understand data analysis and probability.</p>	<p>10-11 <i>Statistics and Probability</i></p> <p>Understand data analysis and probability.</p>	<p>11-12 <i>Statistics and Probability</i></p> <p>Understand data analysis and probability.</p>

Class Structure

Class	Standards
Intermediate Math	Review: 1-12 Focus: 13-19 Secondary: 20-23
Math 1	Review: 13-19 Focus: 20-23 Secondary: 24-27
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Math 3	Review: 24-27 Focus: 28-32 Secondary: 33-36
Math 4	Review: 28-32 Focus: 33-36 Secondary: Pre-Calculus

Zone of Proximal Development

- We believe students learn best when they are learning material that pushes their skill level, but does not exceed it.
 - *If it is too hard, students will not learn.*
 - *If it is too easy, students will not learn.*
 - *Our goal is to find the zone that will maximize learning.*
- Our system is not perfect.

How Are We Going to Know Students Are Learning?

- *Standards based assessments aligned to ACT Standards by topic and rigor.*
- *Quarterly Benchmark Assessments to continually monitor progress of each standards over a longer period of time.*
- *Standardized Tests*
 - *ACT Aspire*
 - *ACT*
 - *MAP – Measure of Academic Progress*
 - *EMPT – Early Math Placement Tool*



What Are We Going To Do If Students Are Not Learning?



- *Retakes*
 - *If a student scores below a 70% on a standards based assessment, our department supports students through intervention and re-assessment.*
- *Item-Analysis*
 - *Benchmark assessments are item analyzed by standard.*
 - *If the students as a whole struggle on a standard, that material is spiraled through again.*
- *Early Learning Time (ELT)*
 - *ELT is a class designed to support a students current math class. The support class is in addition to a student's regular math class*
- *Placement*
 - *It is possible that the content being taught does not match the ability of the student.*

What Are We Going to Do If Students Already Know the Material?

- *Acceleration (students skip a math course)*
 - Students are identified for acceleration using a variety of criteria:
 - *Multiple Assessments*
 - MAP, EXPLORE, Badger, Wisconsin Forward
 - *Work Ethic/Teacher Recommendation*
 - Because students develop at different rates, we give them multiple opportunities to accelerate
 - Our system is not perfect!



QUESTIONS?



Is this working? How do we know?

ACT ASPIRE

- ACT ASPIRE is a college and career readiness assessment designed for students in grades 3-10. Lodi students take this test in 9th and 10th grade.
- The test is taken on a computer
- The test is 65 minutes
- Test questions are aligned to ACT Standards
- Students answer questions that are multiple choice, constructed-response (Justification and Explanation), and technology-enhanced



ACT[®]
Aspire[™]

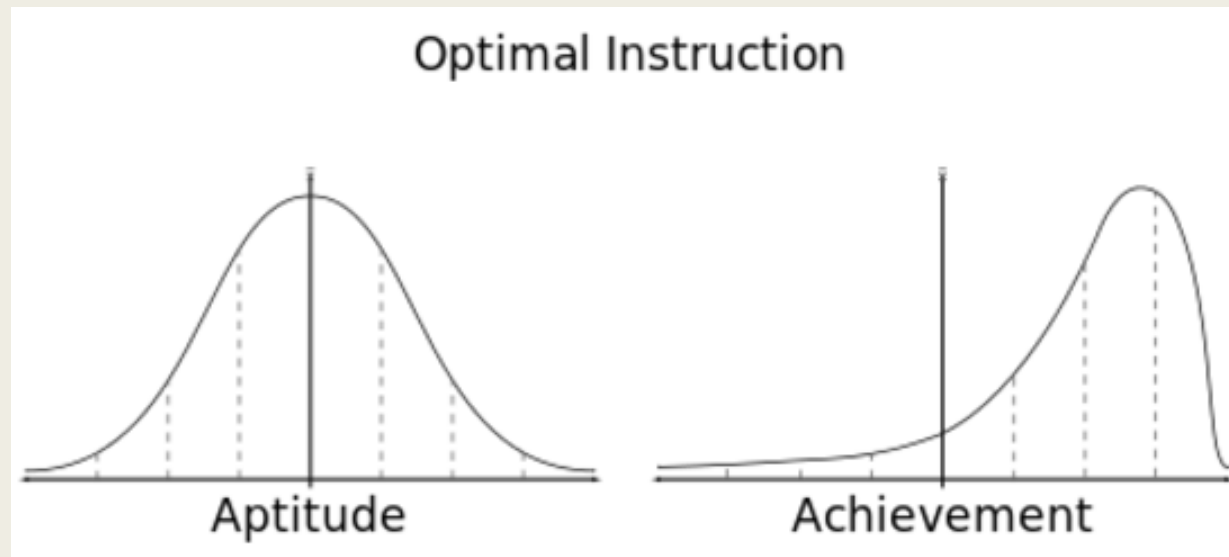
ACT ASPIRE Results (Class of 2018)

	On-Track	Nearly on Track	Off-Track
Score	≥ 432	Between 426 and 432	≤ 426
Percent	63%	22%	15%

- DPI has not released data from other schools to compare to
- Average Percentile Rank was 75.9
- 59 of 139 students were in 90th percentile or above (42%)
- 11 students were in 99th percentile (8%)
- Median = 85th Percentile (Half of our students rank in the top 15% of students that took the ACT ASPIRE)
- 118 of 139 students (85%) rank above the 50th percentile

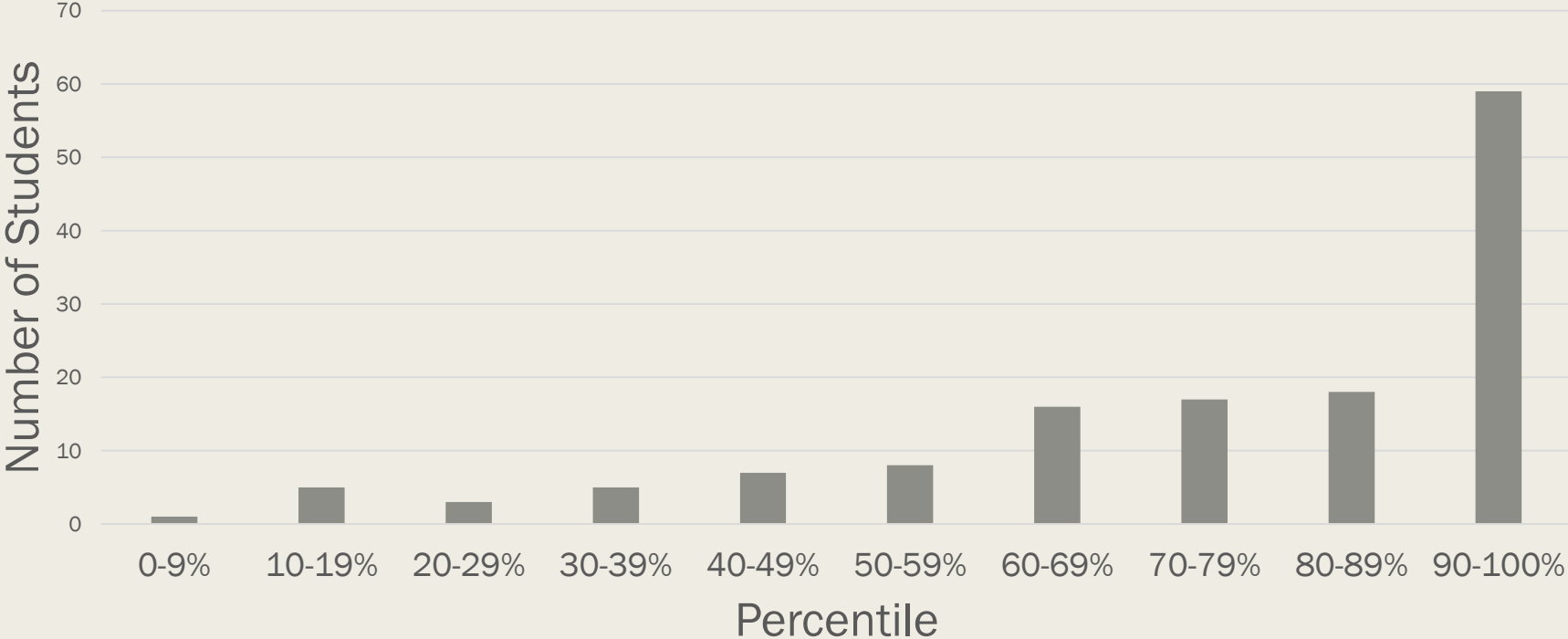
Normal Distribution

- "The normal curve is a distribution most appropriate to chance and random activity. Education is a purposeful activity and we seek to have students learn what we would teach. Therefore, if we are effective, the distribution of grades will be anything but a normal curve. In fact, a normal curve is evidence of our failure to teach." - [Benjamin Bloom](#)



ACT Aspire Data Analysis

ACT Aspire 2018 by Percentile



ACT Results (Class of 2017)

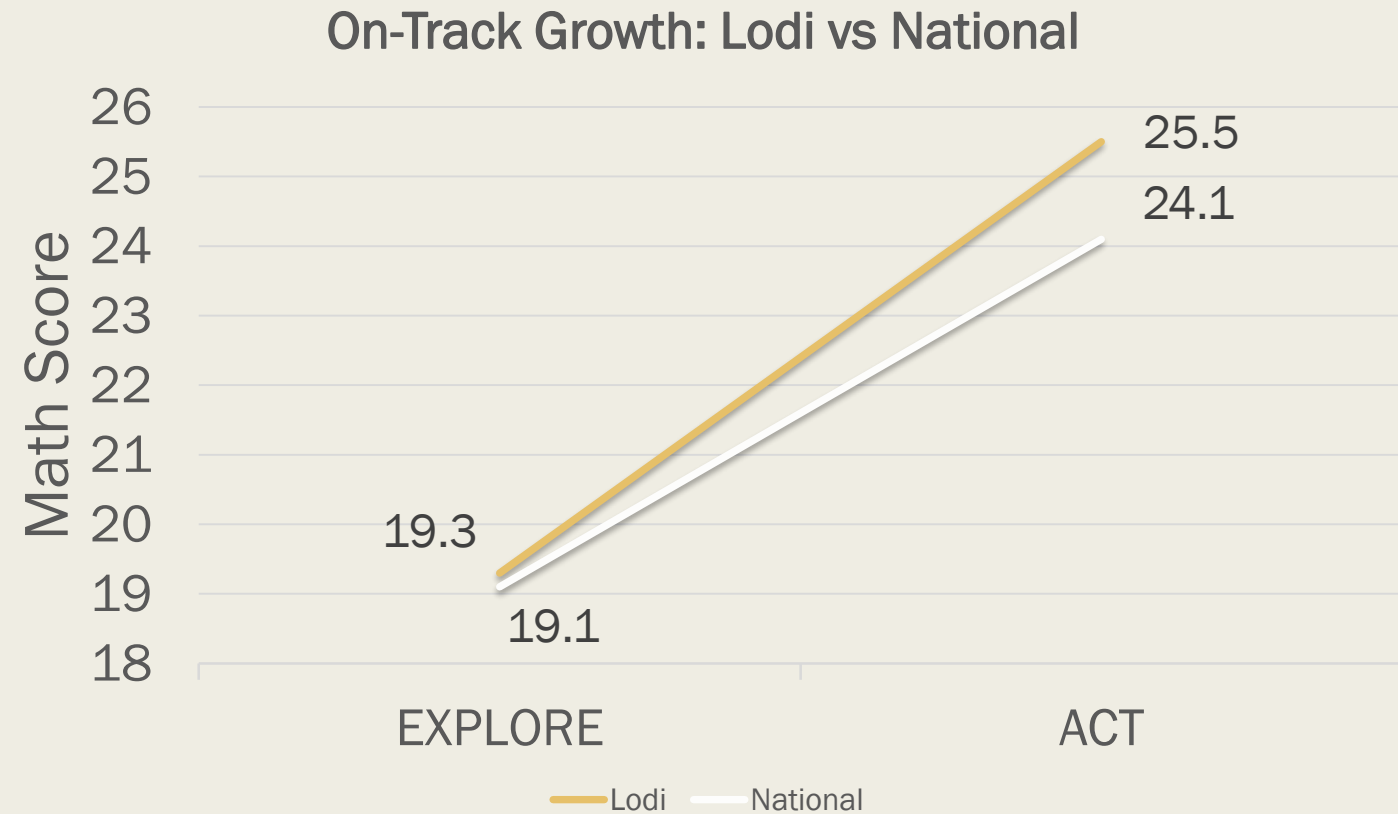
	On-Track	Nearly On-Track	Off-Track
Score	≥ 22	20 or 21	≤ 19
Percent	64%	11%	25%

- The average math ACT score was 23.3 with 64% on-track
 - State average math ACT score was 20.1 with 35% on-track
 - Ranks 1st in our conference
 - Ranks 1st in CESA 5
 - Ranks 3rd in the greater Madison area (Waunakee 23.8, Middleton 23.9)

On-Track Growth

Growth

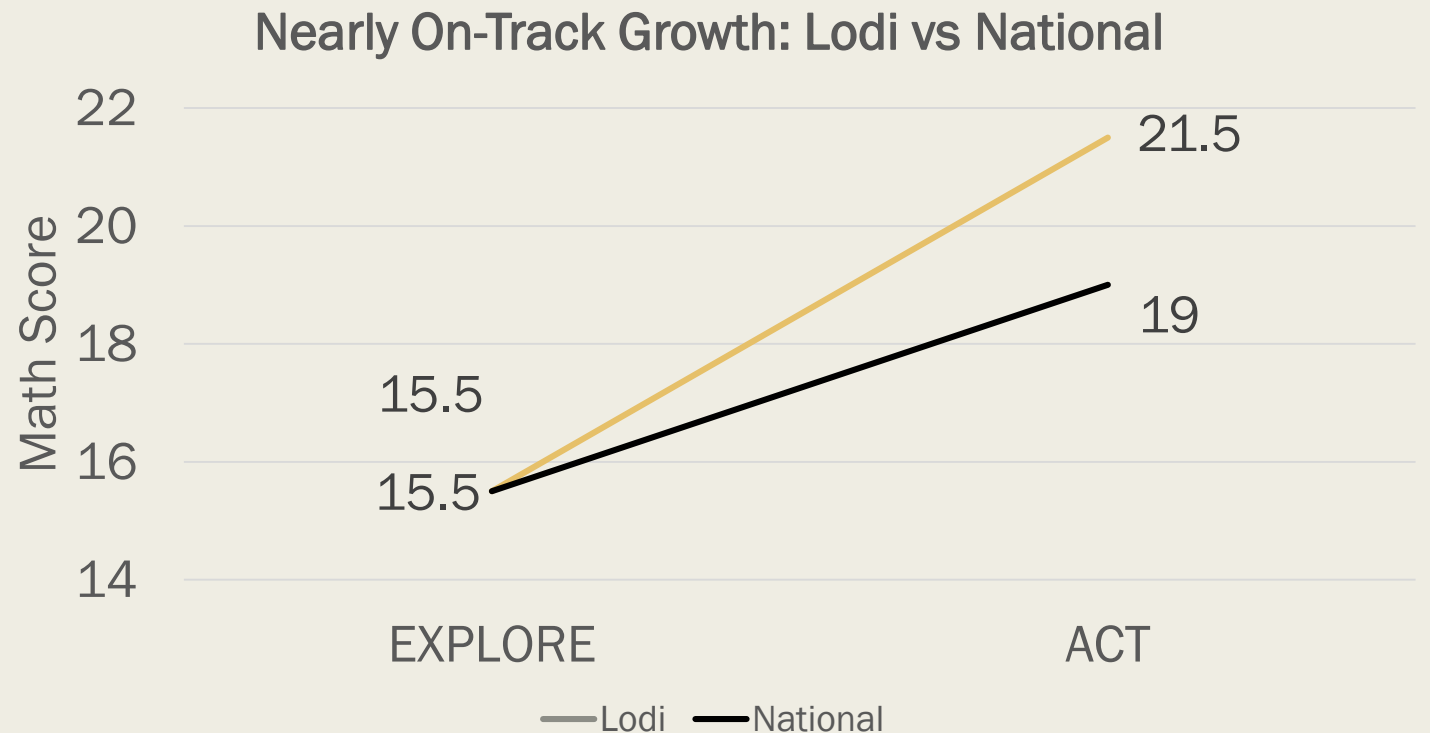
- Lodi – 6.2 points
- National – 5 points
- Lodi student show 24% more growth



Nearly On-Track Growth

Growth

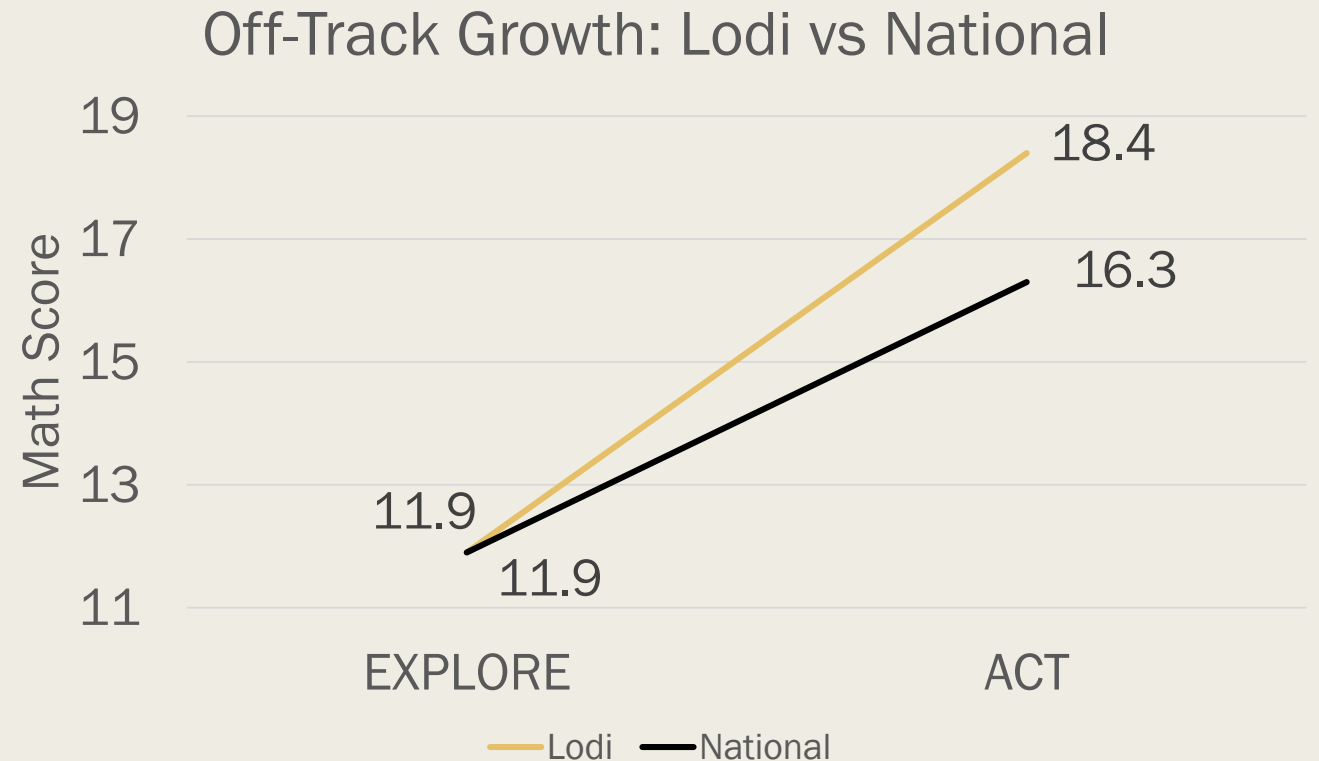
- Lodi – 6 points
- National – 3.5 points
- Lodi student show 71% more growth



Off-Track Growth

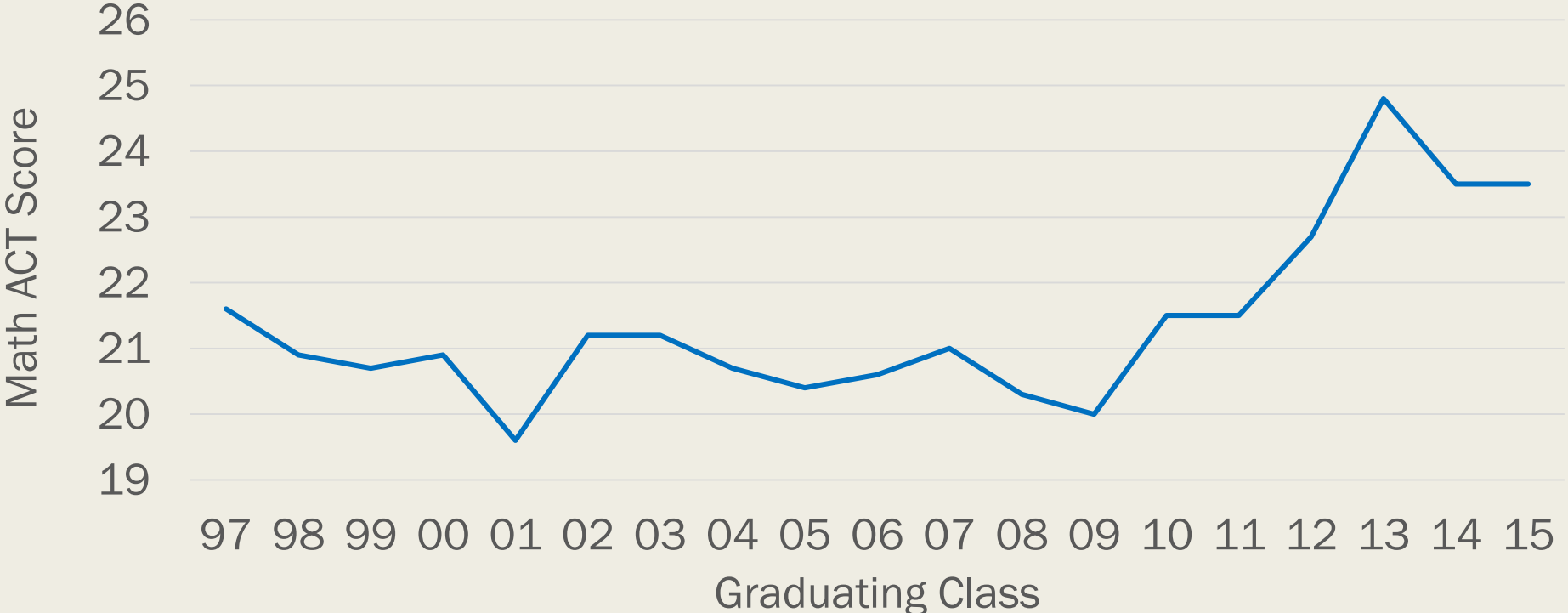
Growth

- Lodi – 6.5 points
- National – 4.4 points
- Lodi student show 47% more growth



ACT Growth Over Time

ACT Scores: 1997-2015



QUESTIONS?

CURRICULUM

What do we do and how do we do it?

The Five Pillars of Mathematicians

Pillars	Examples
Skills and Routines	Solving equations Order of operations
Connections	Linear Tables, Graphs, and Equations
Critical Thinking	Making your own plan to solve a problem
Attitude	Perseverance and growth mindset
Mental Math	Math Facts, Skip Counting, Factors, Multiples

The Creation of a Mathematician

The Five Pillars
Skills – Routines
Mental Math
Connections
Critical Thinking
Attitude

- All mathematicians have strengths and weaknesses.
- To develop students into mathematicians, we must develop all aspects of being a mathematician.
 - *In my experience, most high school curriculum revolves around skills and connections*
- How do we develop the Five Pillars?
 - *We need to focus on each one separately!*
 - *We tend to mix them all together in instruction because all the pillars are necessary.*

Skills

- Skills are routines.
- What is the best way to teach a routine?
 - *Direct instruction and uninterrupted practice*
 - *I do – We do – You do (Teach Like a Champion)*
 - *Using a building block approach*
- SLOT (Sustained Learning Over Time)

Mental Math

- Students need to be taught how to do mental math (this does not necessarily mean memorization)
 - *Addition, Subtraction, Multiplication, Division*
 - *Partial Products ($23 \times 6 = 20 \times 6 + 6 \times 3$)*
 - *Percents (What is 20% of 85?)*
- We take time each day to work mental math (this is new to us)
- www.math-drills.com

Connections

- The interrelationship between different math concepts.
 - *For example, slope.*
 - How does slope affect a table?
 - How does slope affect a graph?
 - How does slope affect an equation?
- We believe guided exploration is the best way to help students develop connections.

Critical Thinking

- We all agree that our students need critical thinking, but we rarely take time to develop critical thinking skills.
- How does a mathematician do a complex problem? (handout)
- We model problem solving skills?
 - *What is this problem all about?*
 - *What information do I have?*
 - *What information do I need? How can I get that information?*
 - *Is my strategy working?*
 - *Did I answer the question?*
- We use non-routine problems that require critical thinking
 - *Stella's Stunners (Hand-out)*

Attitude

- Perseverance
 - *We have students work on problems that require them to persevere.*
 - *Non-routine problems require perseverance*
- Growth Mindset
 - *We show one growth mindset video per month and discuss with our class the importance of having a growth mindset.*
 - *<https://www.youtube.com/watch?v=pN34FNbOKXc>*
 - *<https://www.youtube.com/watch?v=2zrtHt3bBmQ>*
- Interest
 - *We are starting to bring in math related careers to give presentations*

Developing a Mathematician

- All of these pillars of being a mathematician need to be developed, so a math curriculum needs different pieces to develop each pillar

Math



Curriculum

- We have an “Integrated Math Program”.
 - *Intermediate Math (Pre-Algebra)*
 - *Integrated Math 1, Math 2, Math 3*
 - *Math 4 – Pre-Calculus*
- What does that mean to us?
 - *Algebra, Geometry, Number Properties, Ratio and Proportion, and Probability and Statistics are taught in every single course.*
 - *We separate each math topic into layers and teach the basic layers first and get more complex with each class.*
 - Algebra concepts are taught in Math 1, then more complex in Math 2, then more complex in Math 3

Curriculum

- We have created our own curriculum to develop our students.
 - *SLOTS*
 - *Context Sheets*
 - *Non-Routine Problems*
 - *Videos – Math Attitude*
 - *Mental Math*
 - *Notes*
 - *Investigations for Connections*

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Time

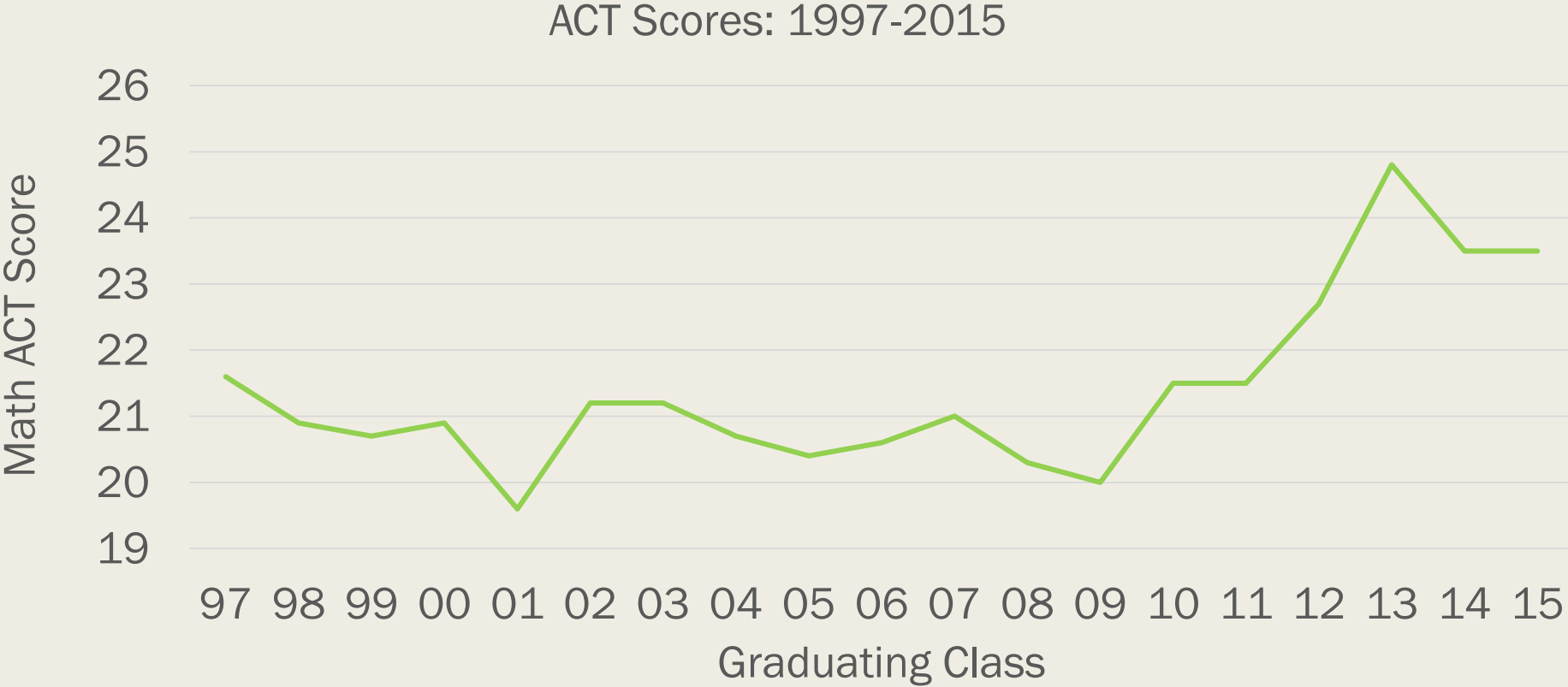
- Learning takes time, but we believe using small pieces of time over a period of days is better than all at once.
- Example: Solving Linear Equation
 - *SLOT to build skills*
 - *Mind Map to help organize student thinking*
 - *Context sheets to apply skills with some critical thinking*
 - *The concept of solving linear equations is spread over multiple mini-lessons. Same amount of time, but spread out.*

Daily Structure for 10/20/16 – Math 2

85 minutes AB Block Schedule

- Warm-up
- SLOT
- HW Questions
- Mind-Map: Factoring
- XEI 505 – Context 1
- GRE 503 – Context 2
- Non-Routine Problem

ACT Growth Over Time



QUESTIONS

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