

Best Practices in K-12 Mathematics for Gifted Learners Using Ohio's K-8 Learning Progressions



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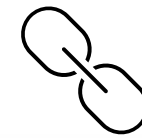
Today's Discussion

Lifting Instruction Using Progressions

Interactive Planning Options

Differentiation Tools

Ohio's K-8 Learning Progressions



[click here](#)

Kindergarten	1	2	3	4	5	6	7	8	HS
Counting and Cardinality									Number and Quantity
Number and Operations in Base Ten					Ratios and Proportional Relationships				
	Number and Operations - Fractions				The Number System				
Operations and Algebraic Thinking					Expressions and Equations				Algebra
							Functions		Functions
Geometry					Geometry				Geometry
Measurement and Data					Statistics and Probability				Statistics and Probability

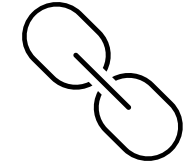
Ohio's K-5 Learning Progressions

Red Addition and Subtraction
 Blue Multiplication and Division
 Black Number
 Brown Geometry

Number and Operations in Base Ten

Kindergarten	Grade One	Grade Two	Grade Three	Grade Four	Grade 5
<p>Work with numbers 11-19 to gain foundations for place value.</p> <p>1. Compose and decompose numbers from 11 to 19 into a group of ten ones and some further ones by using objects and, when appropriate, drawings or equations; understand that these numbers are composed of a group of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.</p>	<p>Extend the counting sequence.</p> <p>1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.</p> <p>Understand place value.</p> <p>2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 10 can be thought of as a bundle of ten ones - called a "ten;" the numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones; and the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).</p> <p>3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.</p> <p>Use place value understanding and properties of operations to add and subtract.</p> <p>4. Add within 100, including adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship</p>	<p>Understand place value.</p> <p>1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:</p> <p>a. 100 can be thought of as a bundle of ten tens — called a "hundred."</p> <p>b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).</p> <p>2. Count forward and backward within 1,000 by ones, tens, and hundreds starting at any number; skip-count by 5s starting at any multiple of 5.</p> <p>3. Read and write numbers to 1,000 using base-ten numerals, number names, expanded form, and equivalent representations, e.g., 716 is $700 + 10 + 6$, or $6 + 700 + 10$, or 6 ones and 71 tens, etc.</p> <p>4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>Use place value understanding and properties of operations to add and subtract.</p> <p>5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the</p>	<p>Use place value understanding and properties of operations to perform multi-digit arithmetic. A range of strategies and algorithms may be used.</p> <p>1. Use place value understanding to round whole numbers to the nearest 10 or 100.</p> <p>2. Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.</p> <p>3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90, e.g., 9×80, 5×60 using strategies based on place value and properties of operations.</p>	<p>Generalize place value understanding for multi-digit whole numbers less than or equal to 1,000,000.</p> <p>1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right by applying concepts of place value, multiplication, or division.</p> <p>2. Read and write multi-digit whole numbers using standard form, word form, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.</p> <p>3. Use place value understanding to round multi-digit whole numbers to any place through 1,000,000.</p> <p>Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000.</p> <p>4. Fluently add and subtract multi-digit whole numbers using a standard algorithm.</p> <p>5. Multiply a whole number of up to four digits by a one-digit whole</p>	<p>Understand the place value system.</p> <p>1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.</p> <p>2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> <p>3. Read, write, and compare decimals to thousandths.</p> <p>a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (\frac{1}{10}) + 9 \times (\frac{1}{100}) + 2 \times (\frac{1}{1000})$.</p> <p>b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>4. Use place value understanding to round decimals to any place, millions through hundredths.</p> <p>Perform operations with multi-digit whole numbers and with decimals to hundredths.</p> <p>5. Fluently multiply multi-digit whole numbers using a standard algorithm.</p>

Ohio's Learning Standards



[Click here](#)

Ohio's Learning Standards

Identify what students need to know and be able to do

Model Curricula

Offer guidance to local educators as they teach with the standards and create aligned assessments

Assessments

Measure how students are progressing through the standards

Resources

Provide tools to help all students and educators

Department Website- Grades K-12

Grades K-12	
Gap Analysis Planning Ahead	Preparing for Instruction
K-8	High School
K-8 Gap Analysis	High School Gap Analysis
K-8 Learning Progression	
Color Coded K-5 Learning Progression	
Grades 6-8 Learning Progressions by Topic	
Grade 8-Geometry Learning Progressions by Topic	
K-8 Critical Areas of Focus	High School Critical Areas of Focus
Model Curriculum & Instructional Supports	
Standards for Mathematical Practice	

Department Website- Grades K-8

KINDERGARTEN – GRADE 8

K - 8 Standards By Grade Level	
Kindergarten Standards	Grade 5 Standards
Grade 1 Standards	Grade 6 Standards
Grade 2 Standards	Grade 7 Standards
Grade 3 Standards	Grade 8 Standards
Grade 4 Standards	

K - 8 Standards Supporting Documents	
K-8 Learning Progressions	Gap Analysis Introduction
K-8 Critical Areas of Focus	K-8 Gap Analysis
Compacted Standards in Middle School	

Department Website- High School

High School Standards By Course		
High School Standards By Course Checklist		
Algebra 1	Geometry	
Math 1	Math 2	
Algebra 2/Math 3		
High School Gap Analysis		
High School Gap Analysis Introduction	High School Gap Analysis	
Algebra 1 Gap Analysis	Geometry Gap Analysis	Algebra 2 Gap Analysis
Math 1 Gap Analysis	Math 2 Gap Analysis	Math 3 Gap Analysis
High School Critical Areas of Focus		
Algebra 1 Critical Areas of Focus	Geometry Critical Areas of Focus	
Math 1 Critical Areas of Focus	Math 2 Critical Areas of Focus	
Algebra 2/Math 3 Critical Areas of Focus		

Why Differentiate?



Thinking through a gifted lens



Students learn best when curriculum is in Zone of Proximal Development



To make materials accessible for all

English Language Learners, Twice Exceptional Students

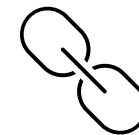


Students learn best with curriculum is relevant and interesting to them

Interactive Activity Example

<u>Standard</u>	<u>Above Grade Level Connection</u>	<u>Incorporation Idea(s)</u>
3.G.1 Draw and describe triangles, quadrilaterals (rhombuses, rectangles, and squares), and polygons (up to 8 sides) based on the number of sides and the presence or absence of square corners (right angles).	4.G.1 Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	<ul style="list-style-type: none">• Study shapes further for patterns: -What do you notice about the sides of shapes with square corners?<ul style="list-style-type: none">• Introduce new vocab: -perpendicular and parallel -Look for these in previously studied shapes
*Draw and describe *# of Sides and types of corners	<u>Angles:</u> right, acute, obtuse <u>Sides:</u> Perpendicular, parallel	*Can be independent study, small group, can use a flipped model (I.E. watch a Khan Academy video on own and then come to station and discuss*

Interactive Task #1



[Click here](#)



OPEN YOUR GRADE LEVEL STANDARD DOCUMENT.



OPEN YOUR APPROPRIATE LEARNING PROGRESSION.



CHOOSE A STANDARD TO EXAMINE.



ASSUME YOU HAVE A STUDENT WHO HAS SHOWN MASTERY OF THIS STANDARD.



HOW COULD YOU INCORPORATE AN ABOVE GRADE LEVEL CONCEPT INTO THEIR LEARNING?

Three Ways to Plan Differentiation

Content

Process

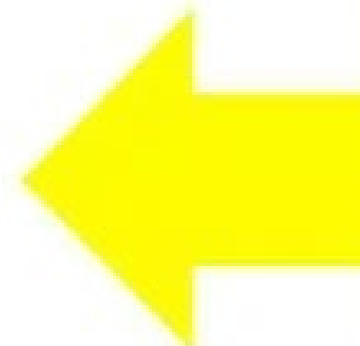
Product

Student and Teacher Roles

The Learner Relationship

What Teachers Prepare

- **Content**
--Access
- **Process**
--Sense-making
- **Product/
Learning Artifacts**
--Evidence



How Students Engage

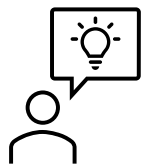
- **Readiness**
--Current Skill Level
- **Interests**
--Choices and Backgrounds
- **Learning Profile**
--Brain Intelligences

- Does every student need this content?
- Will it be newly learned information? Review?
- Where does it fit into the continuum?

- Are there different ways I can make this content accessible based on student learning preference? Readiness?

- How will students show mastery?
- Does the evidence need to look the same for everyone?

Interactive Task #2



LOOK AT AN UPCOMING LESSON OR TOPIC



HOW COULD YOU DIFFERENTIATE THE CONTENT OF THIS LESSON?



HOW COULD YOU DIFFERENTIATE THE PROCESS OF THIS LESSON?



HOW COULD YOU DIFFERENTIATE THE PRODUCT OF THIS LESSON?

Depth and Complexity





Language of the Discipline

- What words are associated with this content?
- What vocabulary do you need to know to work with this content?
- What are the phrases, signs, symbols, abbreviations, or figures of speech you need to understand to work effectively in this content?



Details



Details

Information that enhances understanding

Numbers

Factors

Mathematical Information

Problem Solving

- Which details are relevant (important)?
- Which details are irrelevant (unimportant)?
- Which details are missing from this (graph, table, etc.)?
- What do the details (reveal, suggest, etc.) about ____?
- How do signs associated with numbers (effect their value/change the equation)?

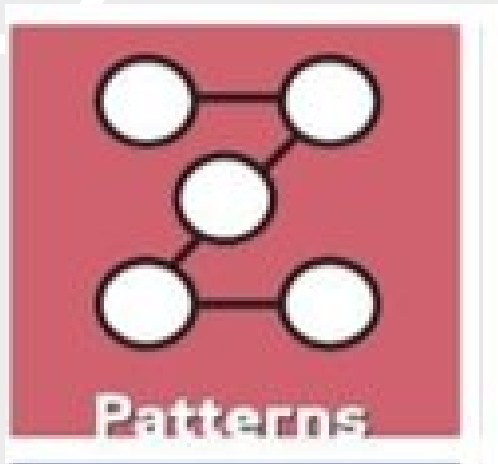
Depth and Complexity in Math



Envision Gifted!

Differentiation for Gifted & Talented Learners

M.Griffith 2015



Patterns

Recurring Elements & Factors
Predictable/ Repetitive/ Ordered

Number lines

Geometric patterns

Probability

Order of operations

Factoring algebra

Fractions, decimals, percents

- How are these _____ related to _____?
- What patterns can you identify?
- How does this pattern allow you to predict _____?
- What patterns do you notice in _____?
- How can you extend this pattern?

 Envision Gifted!

Differentiation for Gifted & Talented Learners

M.Griffith 2015

Depth and
Complexity in
Math



?? Unanswered Questions

Unsolvable Equations
Unforeseen relationships
Missing information
Unclear data/ data representation

- What question(s) might you pose to reveal _____ (how this might be used/applied, etc)?
- Why/how does _____ (drawing a graph, making a table, etc) clarify this problem?
- What are some unanswered questions you still have about this concept?
- What new questions emerge after seeing _____ (this data, graph, solution, etc).

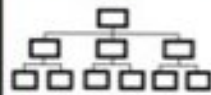
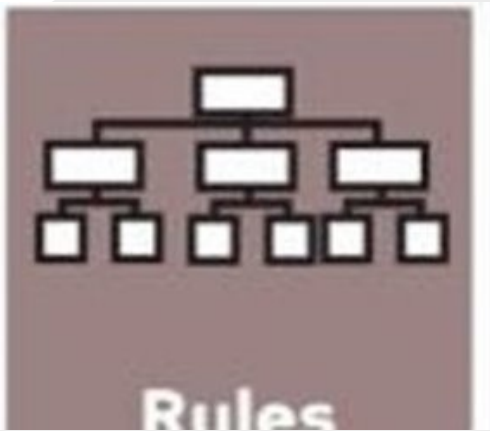
Depth and
Complexity in
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Rules Structure / Arrangement/ Organization

Place value

Number lines

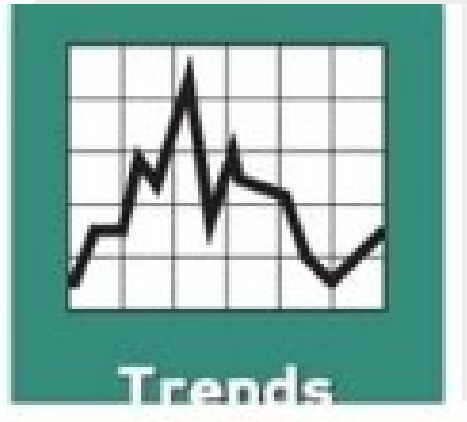
Order of operations

Steps for solving problems

Geometry (shapes, etc)

- What steps are required to solve this problem?
- What is the rule for how _____ is structured?
- What rule is revealed from these data?
- Does changing the rule result in a different answer?
($y=x+1$; $y=x-2$). Why/Why not?
- How does the organization of _____ help us understand_(geometric concept, etc)?

Depth and
Complexity in
Math



Trends

General direction of change
(may be influenced by varied forces)

Statistics and data analysis

Graphing equations (as 'x' increases, 'y' increases exponentially)

Causal Relationships

- How might _____ (one factor, variable, etc) have influenced _____?
- Describe the trends you notice in _____ (patterns, data, test scores, etc).
- What relationship(s) is revealed in this trend?
- What trends can I identify in my math scores?
- What is the best to visually communicate this trend?



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Depth and
Complexity in
Math



Different Points of View/Opposing Viewpoints

Varied approaches to problem-solving/decision-making

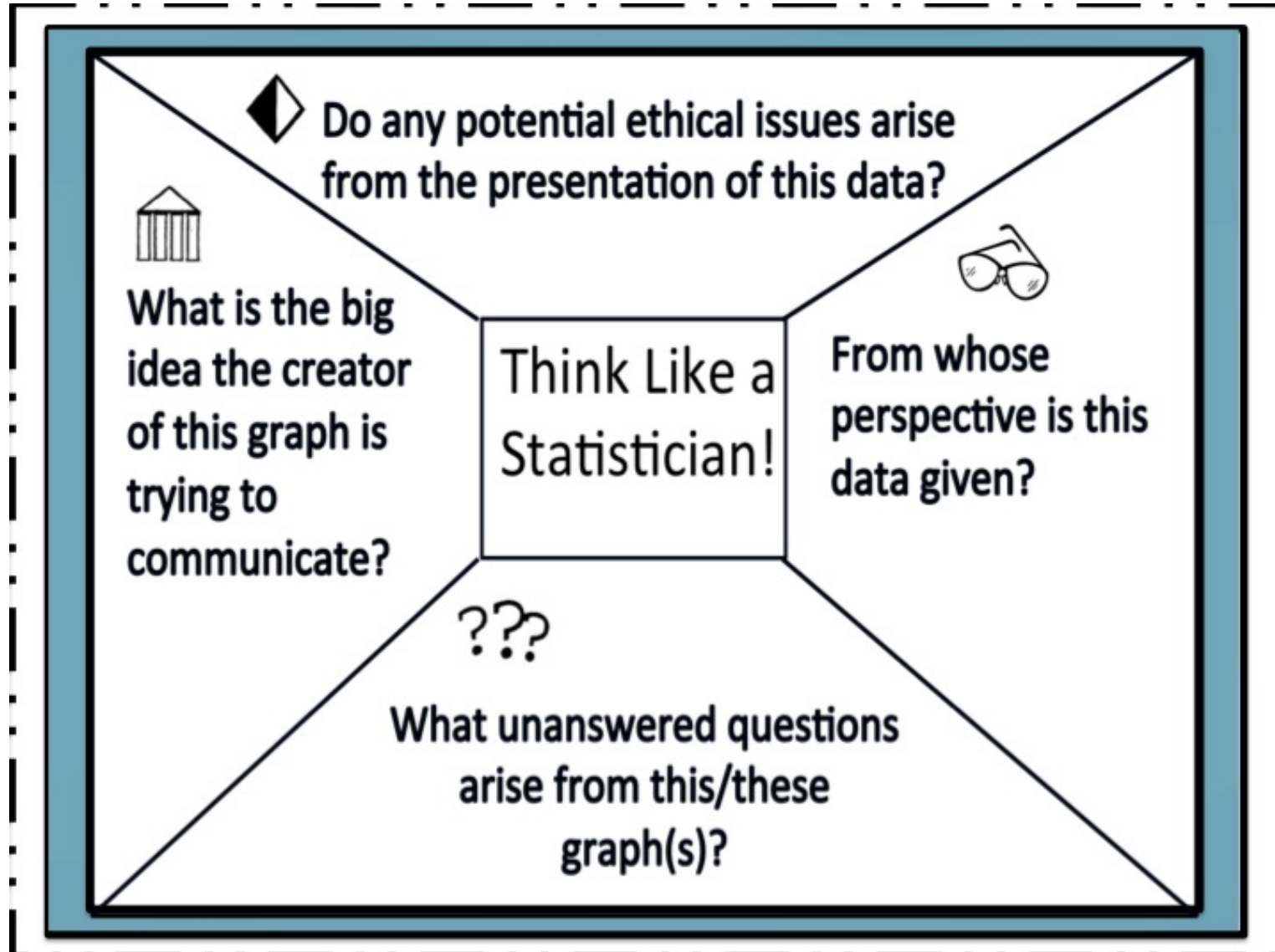
Statistics and data analysis

Data collection and representation

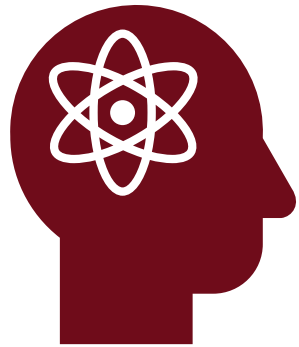
Data interpretation

- Why did you choose this approach to solve the problem?
- Is there a different way to approach this problem?
- Why might this data be presented in this manner?
- Who might be interested in/benefit from this information?
- What type of disciplinarian/profession might use these data?

Depth and
Complexity in Math



Missing Complexity Examples

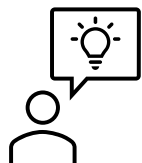


Across Disciplines

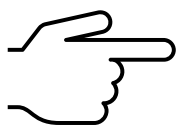


Changes Over Time

Interactive Task #3



LOOK AT AN UPCOMING LESSON OR TOPIC



CHOOSE ONE OR TWO OF THE DEPTH AND COMPLEXITY ICONS



HOW COULD YOU ADD IN THAT LEVEL OF DEPTH AND COMPLEXITY TO THIS LESSON?

Toolbox Takeaways



Set up easy access to important guidance documents

Bookmark in browser
Print and create a binder or display in room



Choose one differentiation strategy to focus on or incorporate into an upcoming lesson

Content, Process, Product
Depth and Complexity



Set up systems that make this differentiation easier on you:

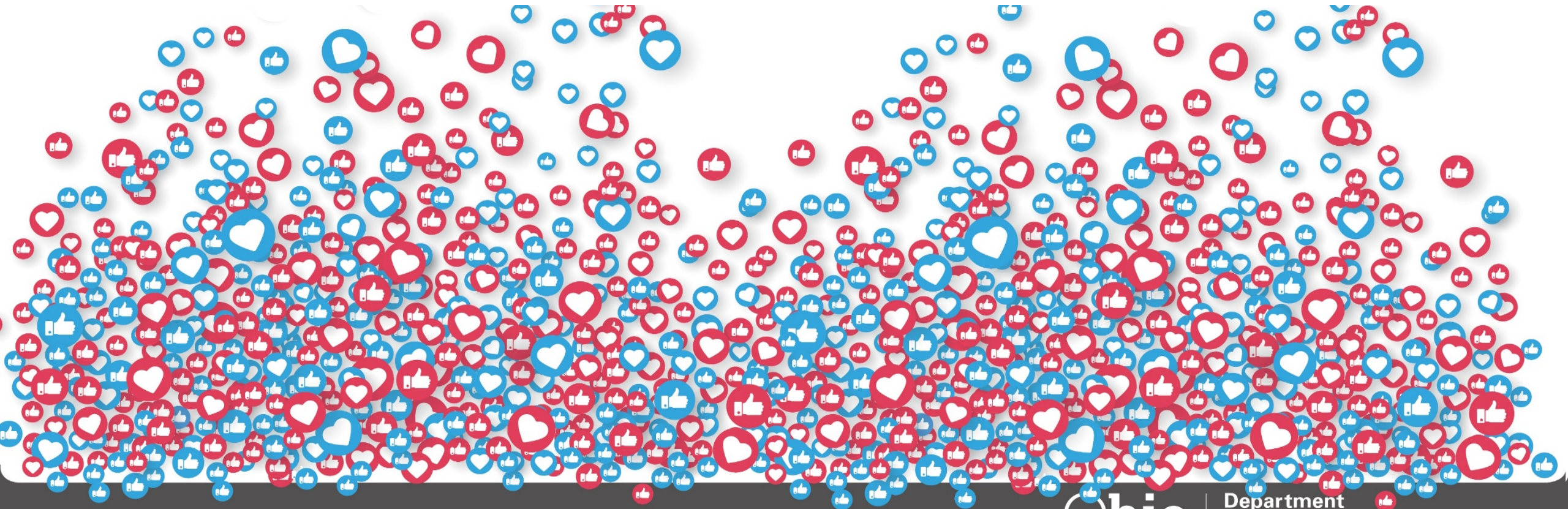
Choice Menu Boards
Stations
Student-guided



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Ohio

Department
of Education

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community with us!**

#MyOhioClassroom



Celebrate educators!

#OhioLovesTeachers