Elementary Mathematics Curriculum Maps in Decatur Township

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Curriculum maps are roadmaps for instruction and learning that show where a class, school, or district has been, where it is headed, and how it is going to get there. Heidi Hayes Jacobs (2008a), a proponent of curriculum mapping, describes it as "a procedure for collecting and maintaining a database of the operational curriculum in a school and/or district." In other words, it is a way of collecting information on the curriculum that is actually being taught.

Jacobs (2008b) also states that "the key purpose of mapping is to improve student performance by reading and reviewing our maps as collaborative professionals. We inform and change our maps based on what our learners need us to be working on for them" (p. 4). The mapping process helps keep teachers aligned with curriculum expectations, timelines, common assessments, and benchmarks. Maps can provide information for articulation across grade levels. They are working documents that are continually reviewed and updated. Interventions can be developed that will target specific student needs and match essential skills to provide student success.

At the same time, curriculum mapping can provide accountability documentation for perusal by the Indiana State Department of Education for schools on academic watch. It can be used as a tool to solve specific problems in a school not making Adequate Yearly Progress (AYP), as defined by the No Child Left Behind federal legislation.

Our school corporation, the Metropolitan School District of Decatur Township, has been developing diary maps, consensus maps, and district maps in all subject areas. Our maps are electronically stored and networked through the software program, Rubicon Atlas. In 2007–2008, the authors of the paper "Teacher Leaders from the Metropolitan School District (MSD) of Decatur Township, in Indianapolis, Indiana" worked on developing an elementary mathematics curriculum map for the teachers in the district.

Indiana Mathematics Initiative Select Cadre of Teacher Leaders

In 2002, the MSD of Decatur Township joined with eight other school districts and Indiana University to work together as part of the National Science Foundation(NSF)-funded grant, the Indiana Mathematics Initiative (IMI). All the initial teacher participants agreed to pilot the NSF-funded elementary mathematics curriculum *Everyday Mathematics*. Two years later, all but one of the nine districts had adopted the curriculum for use in all classrooms. Teachers who had participated in the first years of the IMI project acted as mentors for teachers new to *Everyday Mathematics*, and a subset of the initial teacher participants from each district was chosen to continue to receive professional development on mathematics content, using a reform-minded curriculum and practices in elementary classrooms. These teachers became known as the "IMI Select Cadre" team, and it was expected that team members would take what they had learned in

the IMI professional development and act as mathematics teacher leaders, working with the other teachers in their own districts.

The authors of this paper and the designers of this project are the select cadre team from MSD Decatur Township. Being a part of IMI allowed us to communicate with *Everyday Mathematics* experts through weekly logs and dialogue via network forums with other teachers who were teaching the same lessons. Our IMI workshops allowed us to attend presentations by top mathematics educators in our country, including university professors, representatives from the Indiana Department of Education, superintendents, and high school math teachers. We have been trained in higher-level math skills, the Indiana Statewide Testing for Educational Progress (ISTEP), problem-solving strategies, making instructional materials, and creating authentic assessments.

For example, as teachers in the IMI project began using the chosen standards-based curriculum, they found that one of the difficulties was learning how to effectively and authentically assess their students' learning and understanding in math. In response to participants' requests for help in this area, and along with professional development assessing student learning in a reform-minded mathematics classroom, we worked with the IMI Select Cadre teams from across Indiana and IMI staff members to develop a document entitled "Assessment Opportunities in *Everyday Mathematics*." As the name implies, this was a compilation of the activities in the curriculum that teachers could use to assess their students.

Along with professional development on assessment, as select cadre members we worked with IMI staff members to map the Indiana Academic Standards for Mathematics onto the curriculum we were using. Teachers and administrators needed to be sure that the program was covering the standards and that students were being prepared for the ISTEP tests. We first identified "power standards" for each grade level. These were the standards we identified as being the most important for our students; these were the standards they needed in order to succeed in later grade levels. Then we looked at the goals in the *Everyday Mathematics* program and matched each power standard with the appropriate goals in the curriculum. Thus, as IMI participants, we deepened our understanding of the pedagogical practices that are part of this curriculum, learned about new activities and ideas, and shared resources and projects with each other.

Participating in IMI has enhanced our *Everyday Mathematics* program by providing additional math training and resources. Our cadre team has elected to integrate them into a curriculum map for each grade level K–4.

Curriculum Maps for Decatur Township

As teacher leaders in our district, we looked for a way to provide a central location and easy accessibility for the resources that we had developed and collected, so that they could be shared with and utilized by our colleagues. We decided that one way to do this would be to incorporate these strategies and resources into our mathematics curriculum maps. We felt that this would provide an abundance of online resources to not only novice teachers and teachers new to a grade level but to all teachers. This was a unique format that we could use for recording and sharing ideas with all staff in our district.

There is one select cadre team member at each grade level, the person who was the lead for developing the curriculum map for her grade level. However, we realized that the first thing we needed to do was to decide on a format for the maps, so that they would be similar across the different grade levels. We also wanted a format that would be useful for teachers; we wanted them to be able to download the electronic versions and then adapt them as needed for their own use.

Using a grid format (see Appendix 1 for an example taken from the first grade curriculum map), we began each grade-level map with the *Everyday Mathematics* units listed in the first column. For the second column, we decided what the "essential questions" were. Based on the power standards we had identified with the larger IMI Select Cadre team, these are the "big ideas" in each *Everyday Mathematics* unit. For example, in first grade, the Unit 2 is called "Everyday Uses of Numbers." We listed the essential questions as "How do we use numbers daily?" "What does addition mean?" and "What does subtraction mean?"

In the third and fourth columns we listed the "Content" and "Skills." These were the relevant Indiana Academic Standards for the unit and the accompanying essential questions, along with the specific skills and indicators listed with each "Standard."

The fifth column was for assessments related to the units and standards. Here we listed the assessment opportunities we had developed with the IMI Select Cadre, as well as some that we had developed just for our school district. For assessments that were available electronically for teachers in our district, we included links. (See Appendix 2 for a sample assessment that accompanied the first grade curriculum map.)

The sixth and last column was where we included additional activities for the related units, essential questions, and standards. After attending IMI sessions and collaborating with teachers from across the state monthly during the school year and in the summers for the past three, four, or five years, we had amassed a large collection of activities and website links, and we wanted to have a way to share these with teachers in an organized manner. The curriculum maps provided us with the perfect vehicle for this.

Conclusion

Our association and work with the Indiana Mathematics Initiative allowed us to develop and collect many resources. With our new curriculum maps, we now have a way to consolidate and share these resources, which provide us with more opportunities to support our district teachers. Our curriculum maps have become the hub for resources that can help lead to effective learning and teaching in mathematics.

References

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Appendix 1

Curriculum Map 2008-2009
MSD of Decatur Township
Gennrich, Jeanne / EM Math 1 / Grade 1 (Valley Mills Elementary School)

	Essential Questions	*Content*	*Skills*	*Assessments*	*Resources/ Accommodations*
Unit 1: Establishing Routines *(Week 1, 3 Weeks)*	In what ways do we count with numbers? What is a number pattern?	**Numeration** A. Whole Numbers **Operations and Computation** B. Addition and Subtraction **Patterns, Functions, and Algebra** C. Visual Patterns D. Sequences **Geometry** E. 2-Dimensional Shapes (Polygons) **Measurement** F. Length G. Time H. Temperature **Data and Chance** I. Collecting Data J. Recording/Displaying Data K. Estimating Data L. Probability and Chance **Vocabulary: number line, tally mark, degree, temperature, Fahrenheit**	A1. Read and write numbers to 20* IN. 1.1.1 A2. Read and write ordinal numbers A3. Order numbers to 20 A4. Compare numbers to 20* IN. 1.1.5 A5. Perform rote and rational counting* IN. 1.1.1, 1.1.4 A6. Skip count by 2's, 5's, and 10's B1. Understand meaning of addition/subtraction B2. Solve addition/subtraction number stories B3. Make up addition/subtraction numbers stories C1. Create patterns with 2-dimensional shapes C2. Sort and identify shapes/objects by attributes D1. Count up and back on a number line D2. Count by 2's, 5's, and 10's E1. Identify 2-dimensional shapes E2. Create/extend designs with 2-dimensional shapes E3. Make 2-dimensional shapes on a geoboard E4. Draw triangles and quadrilaterals F1. Estimate and compare distances G1. Use the calendar H1. Use the Fahrenheit temperature H2. Use a thermometer I1. Collect data by counting I2. Make predictions about data	Pretest for First Grade Unit Test 1 Writing Numbers to 20 Forwards and Backwards IU-IMI Assessment on Indiana Academic Standards Writing #'s Forwards & Backwards to 20 Pretest for First Grade IDOE Assessments gr 1 mapped to Units in ISTEP for Unit Test 1	Odyssey-Math Level 1 Nu Sense Number Line Squeeze (1 Penny-Dice Game(1.3,1. Bundling craft sticks(1-5 Top-It(0-15 number card Scissors, Paper, Stone (1 Dice-Roll and Tally Game Top-It(0-20 number card compare pairs of number Reference Folder Sheets I Have... Who Has? Sens Songs, Rhymes, and Cha Calendar Wall Activities Number Grid to 100-5's a Number Grid to 120-2's Before Bed Box-At Home Unitedstreaming.com (vi Animals and Numbers (C to 20) Helpful Websites: marysliveria.org/Rocketn a-e aplusmath.com funbrain.com gamequarium.com coolmath-games.com theproblemsite.com toonuniverstiy.com printactivities.com theschoolbell.com Before Bed Box Calendar Wall Activities I Have... Who Has? First Sens Number Grid to 100 with mpl 5's, 10's Number Grid to 120- Counter Reference Folder Sheets 1 Reference Folder Sheets 2 Reference Folder Sheets 3 Songs, Rhymes, and Chants

Appendix 1 (*continued*)

			I3. Conduct a survey J1. Make a tally chart K1. Compare two sets of data K2. Summarize and interpret data L1. Explore equal-chance events L2. Predict outcomes L3. Conduct experiments		
Unit 2: Everyday Uses of Numbers (Week 4, 4 Weeks)	How do we use numbers daily? What does addition mean? What does subtraction mean?	**Numeration** A. Whole Numbers B. Money and Decimals **Operations and Computations** C. Addition and Subtraction **Patterns, Functions, and Algebra** D. Number Patterns E. Sequences F. Number Sentences **Geometry** G. 2-Dimensional Shapes (Polygons) **Measurement** H. Length I. Money J. Time **Vocabulary: number grid, unit, analog clock, hour hand, minute hand, estimate, clockwise, midnight, noon, A.M. P.M., penny, cent, nickel, add, plus, number model, subtract, minus**	A1. Read and write numbers to 20 A2. Perform rote counting A3. Perform rational counting* A4. Skip count by 2's, 5's, and 10's A5. Find complements of 10 *IN 1.2.3 A6. Display and read numbers on a calculator B1. Use cents notation B2. Identify equivalencies and make coin exchanges *IN 1.5.7 B3. Show money amounts with coins B4. Calculate the value of coin combinations *IN 1.5.7 C1. Understand meaning of addition/subtraction C2. Solve addition/subtraction number stories *1.3.1 C3. Make up addition/subtraction number stories C4. Find/use complements of 10 C5. Solve change-to-more and change-to-less number stories/diagrams C6. Find patterns in addition/subtraction facts D1. Count up and back on a number grid D2. Find patterns in	Unit Test 2 Coin Template Missing Numbers Skip Count by 5's and 10's Counting to 20 Forward and Backwards by 1's Skip Count by 5's and 10's Counting by 2's, Counting Backwards from 20 Money Template Unit Test 1 Unit 2 Missing Numbers	Odyssey-Math Level 1 Oı Shapes Apple Math Project: Cour (Unit 2 or after) Pumpkin Math Project: C pumpkin seeds (Unit 2 oı Rolling for 50(2.1) Numbers All Around Museum:Explore uses an categories of numbers(2. Two-Fisted Penny Additic pennies)(2.3) Penny Grab(2.8) Penny Cup(2.8) Penny Guessing(2.9) Penny Nickel Exchange(2 Coin Top-It(2.10) Penny-Drop Addition(2.1 Nickel/Penny Grab(2.11) High Roller(2.12) Unitedstreaming.com (vi Discovering Math:The Na Use of Mathematics, Disc Math: Arithmetic (concer addition and subtraction, estimation, computation)

Appendix 2

Math Pretest- First Grade

Name_____

1. Write the missing number.

7, ____, 9, 10

2. What comes next?

____

3. How many balls are shown?

○○○○○○○○○ ____

4. How many balls are left?

○○○○ - ○ = ____

5. What number comes after 20?

____

Appendix 2 (*continued*)

6. Circle the clock that shows 3:00.

7. Circle the number that is bigger than 6.

4 7 3 5

8. Write the number that comes next in the pattern.

20, 30, 40, 50, _____

9. Write the missing number.

3 + 4 = ____

10. Circle the smallest number.

27 22 26 24