

POST SABBATICAL REPORT

KALAMAZOO VALLEY COMMUNITY COLLEGE

Kelly Digby

MATHEMATICS DEPARTMENT

POST SABBATICAL REPORT - KELLY DIGBY

ORIGINAL STATEMENT OF PURPOSE

The purpose of my sabbatical is to gain a better understanding of the curricular changes in elementary math education courses in Michigan's four-year universities, so that we can create valuable courses with appropriate rigor to help prepare our future elementary educators for effectively teaching mathematics to our state's youngest students. In order to develop a sound and thorough understanding of what these four-year universities deem necessary in accordance to the new state requirements, I need to make a number of visits to our education partners and see firsthand, all of those who have a stake in our course development. I plan to visit other 4-year universities in the state to see how their math teacher education courses have changed, but will put my primary focus on the two schools where the majority of KVCC students transfer. Visiting other local community colleges to discuss how they have changed their curriculum to accommodate the legislative changes and their 4-year university counterparts will also be necessary. And, finally, I would like to visit local elementary schools to observe math lessons being taught in PreK – 5 classrooms. Because I have never personally taught elementary school, I believe observations of seasoned elementary teachers would give me better insight into what our current elementary educators are facing.

POST SABBATICAL REPORT - KELLY DIGBY

ACTIVITIES PERFORMED, OBJECTIVES ACCOMPLISHED, CONCLUSIONS DRAWN

Objective 1: Meet with both WMU and GVSU math education professors to discuss the changes made in their elementary math education courses and sit in each of the new courses to observe the teaching of the objectives first-hand.

I had the pleasure of observing Dr. Terry Grant's Math 2530 (Number and Computation I) at Western Michigan University on numerous occasions during the fall 2023 semester. Dr. Grant and I were able to meet multiple times before and after those observations, providing me the opportunity for professional dialogue with regard to the course set-up and WMU's course expectations. Dr. Ok-Kyeong Kim was also a part of some of these conversations, as she is collaborating with Dr. Grant in the creation and implementation of Math 2530 at WMU.

The two courses that Western is accepting for transfer credit from KVCC early education students are Math 153 – Early Mathematical Reasoning (currently in its first semester) and Math 155 – Number and Computation (beginning fall 2024). Math 153 will transfer in as WMU's Math 1520, while Math 155 will count for WMU's Math 2530. During fall semesters, Western is only offering Math 2530, while Math 1520 will be offered only in the spring semesters. This meant I was only able to sit in on one of the two classes I planned to attend. Thankfully Dr. Grant, who has taught Math 1520, was able to give me information regarding the expectations and set-up of the course. In addition, her colleague Dr. Kate Kline, who is the lead professor for Math 1520 has been very transparent and willing to share resources for our Math 153 that is currently being taught and created by Chris Cockerel.

Sitting in on Dr. Grant's Math 2530 was extremely beneficial as I begin to develop Math 155. Our old math courses for elementary teachers focused mostly on content with a small amount of pedagogy and methods thrown in for context. During my observation this past fall, it became clear that our math courses now need to be focused on pedagogy and methods with regard to the mathematical content. The content covered has to be minimized in order to help our students develop a much more robust number-sense and comfort recognizing and evaluating an elementary student's mathematical understanding. This need for adjustment was also solidified when visiting elementary schools and speaking with current elementary teachers and administrators. Many confirmed that our prospective teachers need more training with number-sense and less with high-level math content. Our elementary teachers need to be eliciting sound mathematical thinking and communication from their students. If the future teacher's number-sense is lacking, this is a very difficult task for them.

Dr. David Coffey, professor of mathematics at Grand Valley State University, explained the changes that GVSU has made to their PK-3 math courses. Much like WMU, Grand Valley has incorporated a significant amount of pedagogy and analyzing student thinking into their curriculum. They have altered their previous offerings in a way that does not necessarily align directly with KVCC (or WMU), but the overwhelming need for better number-sense amongst prospective elementary

teachers is a common thread. David confirmed that GVSU's courses have veered away from content-based assessments and have leaned into preparing our future teachers to effectively elicit and analyze student thinking. He stressed that there is little traditional testing, and instead the focus is on collaborative projects, interviews that elicit and interpret student thinking and designing assessment plans at the elementary level.

It was brought to my attention that Grand Valley no longer requires Math 150 – College Algebra as a prerequisite course for the early elementary math courses. This is good news, as our counselors will not need to determine which 4-year university our education students will be transferring to prior to setting up a plan. All of our education students will simply be required to take Math 115 before taking Math 153, thus streamlining the advising process for transfer students and those working toward the Associates degree in Early Education here at KVCC.

Due to the fact that the majority of our Early Education students transfer to Western Michigan University, it was reaffirmed through my discussions with both Dr. Grant and Dr. Coffey that the KVCC courses needed to meet the requirements of WMU first and foremost. It is likely that our courses will transfer in as “some” math credit for students transferring to GVSU, but the transfer credit will have to be determined by the GVSU counselors and admissions. Because our courses are now focusing more on pedagogy and methods, I am hopeful that credit will be given for one or two of their 3 required math courses.

Objective 2: Visit local community colleges to discuss the changes they have made in order to meet the needs of our 4-year university counterparts.

I was put in contact with each of the following math education instructors at five of Michigan's other community colleges. I was able to discuss the changes they have made, or are in the process of making, with four of the five. A summary of my findings follow:

Oakland Community College – Barbie Hoag

As of yet, OCC has not made any changes to their math education courses. The dilemma they are facing is similar to our concern about meeting the needs of both the WMU and GVSU programs. However, their roadblock is much more cumbersome, as the majority of their students transfer to Oakland University, Wayne State University, Central Michigan University, Saginaw Valley State University, GVSU or WMU. Each of the four-year universities have altered their math education courses/programs in different ways. Meeting the needs of each is proving to be very difficult. Therefore, in the words of Barbie Hoag, “they are limping along with the current courses.”

Washtenaw Community College – Nichole Klemmer

WCC instructors have been working closely with Eastern Michigan University over the years. As of now, the only change they made at WCC has been adding “Analysis Assignments” to their existing Math for Elementary Teacher courses. As a result, they have not completed an entire revamp of their course offerings. The two courses they offer still focus mainly on content. This is a major difference for us, as WMU's focus has significantly changed to number sense and analyzing student thinking. Content is no longer the main focus for our courses. At this time, EMU accepts their “adjusted” courses for transfer.

Grand Rapids Community College – Monica Bliss

GRCC students typically transfer to either Grand Valley State University or Ferris State University. As such, they have redesigned their courses in a way that fits the needs of GVSU and Ferris, rather than WMU, who has reorganized their program in a very different way.

Grand Rapids Community College used to offer two transferrable math courses for future elementary teachers. However, after the restructuring done by their 4-year university counterparts, they have taken their previous two 4-credit hour courses and broken them up into two 4-credit and one 3-credit course. The two 4-credit hour courses discuss counting, whole number operations, fractions, decimals and proportional reasoning in depth. Their new 3-credit hour course focuses on geometry and measurement.

Lake Michigan College – Brenda Shepard

Lake Michigan College has two courses created on paper that are equivalent to the first two math courses required of GVSU elementary education students. They made the conscious decision to lean toward GVSU as their first priority, because like us, they could not come up with a way to create math courses that could work for both WMU and GVSU. They have yet to run either of these classes, however. This has been held up because not all of the courses needed for a 2-year transfer pathway have been created.

Kellogg Community College – Emily Patterson

Unfortunately, I have not been able to reach Emily to speak about KCC's changes. However, I will keep trying over the next few months.

Summary

Hearing from all of the above colleges was encouraging. KVCC appears to be ahead of the game when working with our 4-year counterparts. The articulation agreement with WMU has put us in a good position to offer students a 2-year degree which many other community colleges have yet to create.

Objective 3: Observe at least one math lesson taught in each of the grade levels (PreK – 5) at local elementary schools and collect examples of student work.

In September 2023, I began reaching out to teachers and administrators in local school districts. Representatives from both Kalamazoo Public Schools and Portage Public Schools responded positively. Shortly after making contact, I met with KPS's Coordinator for Mathematics and Science, Kristen Miller. I spoke with her about collecting student work from some of the KPS elementary schools, which she said she would help facilitate.

Eureka Math is used by both Kalamazoo and Portage Public Schools. It is a K-5 math curriculum that is broken up into Modules. Each module contains problem sets that are done during class time with teacher guidance and redirection. In addition, there are homework sheets that pair up with each of the problem sets completed in class. So, my original thought was to collect homework problems before they were graded so that I could have examples of student thinking/work prior to redirection. However, it became clear immediately that this would be nearly impossible. This would

require me to be at schools at just the right time to pick up the work and/or would require teachers to do a substantial amount of work (copying and scanning) during an already overloaded schedule. I am definitely not comfortable asking them to do that, which made me re-evaluate the importance and feasibility of collecting student work in this manner.

Shortly after meeting with Miller, I visited my sister and her family in Fort Collins, Colorado where my niece is currently in 2nd grade at Bamford Elementary School. During my visit, I was able to sit in on one math lesson for each of the grade levels (K-5). In addition, I was given the opportunity to speak at length with the principal and teachers. This gave me great insight into what administrators are looking for in future teachers, as well as what teachers wish they knew about teaching math before going into the classroom. It was made clear that a strong number sense is essential when teaching the Common Core Standards.

Bamford uses the enVision Mathematics curriculum created by Savvas Learning Company (Pearson K12). I was able to look over the curriculum while visiting and was impressed with how the material was presented, as well as the resources that were provided. I have begun collecting my niece's work to use as examples in future classes. In addition, I now have a connection with the principal who has agreed to scan tests periodically for me to use as examples of student work.

Regardless of the curriculum, however, it became clear that elementary schools across the country are teaching standards that are consistent. With the implementation of the Common Core Standards, an educational standard has been set for all educational institutions. Michigan may have changed the math expectations for preparing future teachers, but at least I now can see more clearly what I am preparing the students to teach, whether it be with the enVision, Eureka or other math curricula.

Upon returning from Colorado, I met with the math specialists at Portage Public Schools for a brainstorming session. It became clear during this meeting that collecting student work should not be my focus. Instead, video analysis of student/classroom work was suggested as a much more valuable tool. The specialists stressed the importance of preparing prospective teachers for number talks and eliciting student thinking that surpasses the memorization of facts. Luckily, I was invited to participate in a professional development day at Portage Public Schools on October 27, 2023. Jessica Winstanley went through a presentation regarding Number Talks and their importance with all elementary grade level teachers (Appendix B). In addition, she provided online resources (Appendix A) that I plan to integrate into my class.

All of my observations and meetings were extremely beneficial. I feel much more prepared to create and implement effective and practical math education courses for our prospective early education teachers. In addition, I have made multiple connections that I will be able to contact throughout the development process and beyond.

POST SABBATICAL REPORT - KELLY DIGBY

SUMMARY OF HOW CRITERIA FOR SABBATICAL LEAVE PROPOSALS WERE FULFILLED

CRITERIA FOR SABBATICAL LEAVE PROPOSALS

A. Enhance faculty member's effectiveness

I have been wary about creating and implementing our new math courses for elementary teachers since the change in state legislation. However, after this sabbatical, I feel more adequately prepared to create a math course that will be practical and beneficial for future teachers. In addition, I feel I am able to assist Chris Cockerel and any other teacher who may teach math to future elementary teachers in the coming years. The practical knowledge and observational experience will positively impact the creation and implementation of Math 155.

B. Enhance the institution's ability to fulfill its mission

KVCC's mission is to "create innovative and equitable opportunities that empower all to learn, grow and thrive." The opportunities that I will be able to provide for our future elementary teachers will be far more robust and empowering due to my experience visiting elementary schools and observing WMU's math class during my sabbatical. The knowledge and connections I have gained through this experience will definitely improve the educational experience of our future teachers, and thus, the publics we serve.

C. Degree to which the proposed sabbatical leave objectives exceed expectations for routine, ongoing professional development

This sabbatical leave exceeded expectations for routine, ongoing professional development. I had the opportunity to sit in on Western's comparable math education course to determine how best to develop our new math education courses. These courses will not only prepare our students for their 4-year university educational career, but more importantly, their future elementary teaching career. Being able to observe Dr. Grant for an entire semester was an experience I would not have been able to do during a normal teaching semester. In addition, I had the opportunity to meet with local and out-of-state school districts to gain knowledge with regard to what our future elementary teachers need to be exposed to in order to be most successful in a classroom of their own. All of my observations will help me to create activities and curriculum that will help to better prepare our KVCC future educators to effectively teach math to elementary students.

D. Opportunity for reflection and renewal.

“Renewal” is the term I would use to describe this sabbatical experience. From March 2020 to August 2023, work consumed my life. The pandemic forced all classes online, MI-Reconnect forced the creation of corequisite math courses and I was “forced” to take 18-credit hours of graduate level math courses. Those three years were exhausting and I was drained and weary. This sabbatical came at the right time. I completed my graduate classes and was able to take a break from the grading and planning. I was able to travel, read, sit, breathe and relax. To be honest, I didn’t realize how much I needed this renewal period. I longed to be back in the classroom towards the end of the sabbatical and am ready and excited to create and plan an effective course for future teachers. I am rejuvenated and forever grateful for the “renewal” opportunity this sabbatical provided.

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APPENDICES

APPENDIX A:

Online resources provided by Jessica Winstanley from Portage Public Schools:

Number sense routines examples:

<https://sites.google.com/henrico.k12.va.us/hcps-elementary-math-routines/home>

How to build routines:

<https://www.therecoveringtraditionalist.com/components-number-sense-prek-2/>

Early Math videos:

<https://www.youtube.com/@EarlyMathinMichigan/playlists>

Learning Trajectories for Birth to 3rd grade

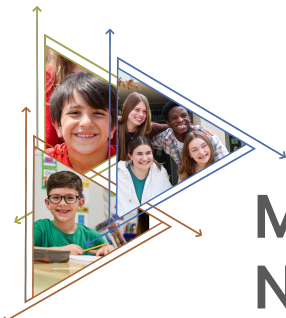
<https://www.learningtrajectories.org/math/learning-trajectories>

Research and Resources created by Dr. Jo Boaler at Stanford University

<https://youcubed.org>

APPENDIX B:

The PowerPoint presentation that Jessica Winstanley created for the PPS professional development follows:



Feel free to follow along: <https://ppsurl.me/ns2023>

Making Sense of Number Sense

October 27, 2023 - PD Day
Kindergarten - 5th Grade

AGENDA

- ➔ **ACTIVATE & ENGAGE**
Engage in a Number Sense Routine
- ➔ **EXPLORE & DISCOVER**
Build our common understanding around Number Sense Routines and the five components of the routines
- ➔ **ORGANIZE & INTEGRATE**
Dig deeper into your learning and plan for how you will apply what you have learned about Number Sense Routines

1 Feel free to follow along: <https://ppsurl.me/ns2023>

CONNECTION TO 5D+ FRAMEWORK

SE1: Quality of Questioning
Teacher asks questions to probe and deepen student understanding or uncover misconceptions. Teacher assists students in clarifying and assessing their thinking with one another. Students question one another to probe for deeper thinking.

SE4: Opportunity and support for participation and meaning making
Teacher sets expectations and provides support for engagement strategies and structures that facilitate participation and meaning making by students. All students have the opportunity to engage in discipline-specific meaning making. Meaning making is often student-led.

CEC2: Learning routines
Learning routines for discussion and collaborative work are present, and result in effective discourse. Students independently use the routines during the lesson. Students are held accountable for completing their work and for learning. Students support the learning of others.

CONNECTION TO PPS CI PLAN

STRATEGY 1
Support each student using the continuum of Tier I instruction and support.

LEARNING TARGETS



- Target 1** I can explain the what and why of number sense routines.
- Target 2** I can discuss, identify, and implement the five components of a quality number sense routine
- Target 3** I can execute my plan for implementing number sense routines in my classroom



ACTIVATE & ENGAGE

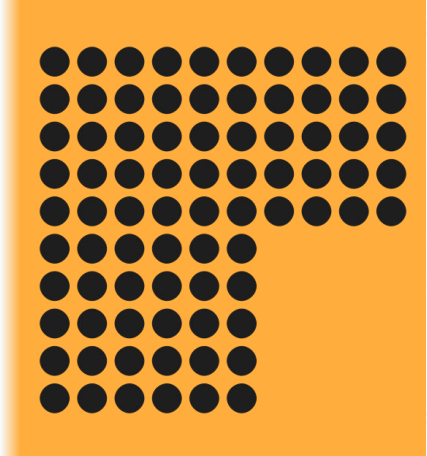
Building our Number Sense: Engage in the Learning



WARM UP

Look at the image on the right.

- How many dots are there?
- How do you know?



WARM UP

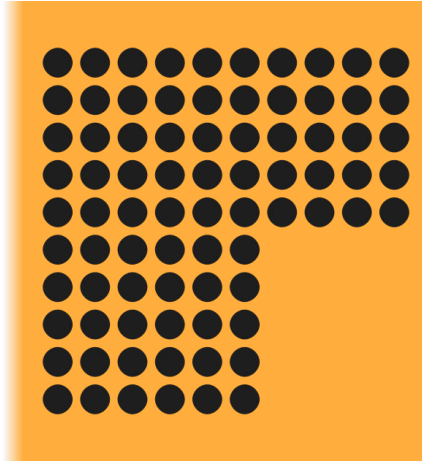
With a partner share your ideas:

- The strategy I used was...
- When I looked at the image I saw...



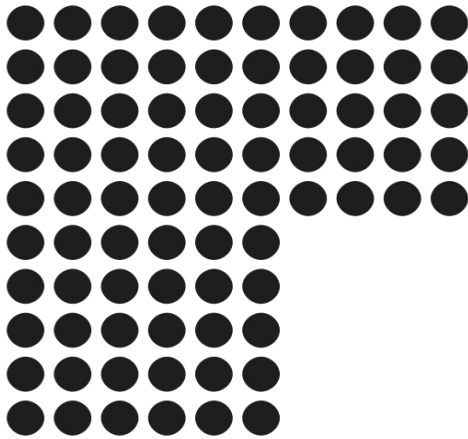
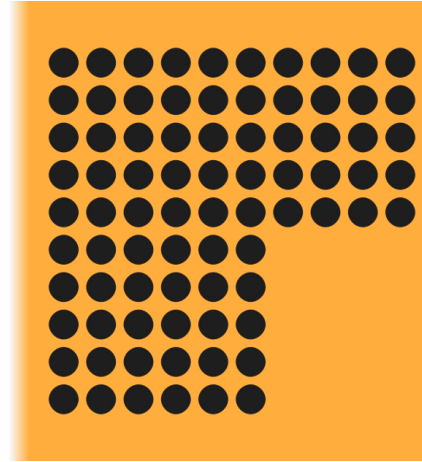
WARM UP

What strategies did you or your partner use to solve?



WARM UP

What connections do you see between the various strategies? What mathematical strategies did people use to solve the problem?



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GOING META

EXPERIENCE EXPLORATION

You just experienced an example of a Number Sense Routine/Math Talk

Reflect on the experience:

- What were the steps of the process?
- How did it activate your thinking?
- When have you used something similar in your mathematics classes?



EXPLORE & DISCOVER

Building our Number Sense: The What and the Why of Number Sense Routines



NUMBER SENSE ROUTINES ARE ESSENTIAL

Read Essential 6

- Find words, phrases or sentences that is standing out to you today
- How do the practices described align to what you currently do?
- What might you need to do to your current practices to incorporate what you just learned?
- Share with a neighbor your thoughts with a neighbor



Essential 6

Engage children regularly in brief (5-10 minutes) interactive number sense routines focused on developing mental strategies for seeing quantity and working flexibly with numbers.

Brief interactive number sense routines typically include the following steps:

- the teacher poses a visual, verbal, and/or written mathematical prompt (e.g., "How many dots did you see?"; "How might you solve 32 x 5 using a mental strategy?")
- children think individually,
- suggested by the teacher, children share thinking, including mentally formed ideas;
- the teacher notices and/or verbalizes the children's strategies; and
- the learning community discusses the thinking that emerged and works to draw conclusions (e.g., "How do you know that doubling one factor and halving the other works? Does it always work?" and "Is this always an efficient strategy?").

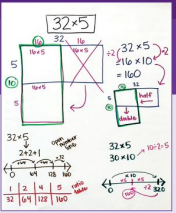


Photo: Number sense routines. Note: The example questions included in the description of typical number sense routines in the 6th were based on the student thinking shown in the photo above.

- Use accessible prompts to engage children in conversations about purposefully crafted, open-ended and/or quantitative reasoning problems to be solved mentally.
- Encourage children to develop their own strategies, working toward solution strategies that make sense to them.
- Elicit children's thinking by asking them to share and explain their solution strategies, discuss the strategies of others, and make connections among multiple strategies.
- Support children in paraphrasing one another's thinking to better communication and language development.
- Nurture children's strategies, as they collectively reason about numbers, to make them accessible to others and to encourage movement toward increasingly flexible and sophisticated mental strategies.
- Emphasize sense-making and de-emphasize speed.
- Prioritize joy and curiosity by inviting children to share their mathematical ideas, strategically explore those ideas with one another even though some may not yet be fully formed or correct.

LIFT THE LINES: WHAT ARE NUMBER SENSE ROUTINES?



"Students need quick, explicit, daily experiences with number sense concepts. Routines provide that structure, no matter what you are teaching during the mini-lesson or during the active learning portion of the math block. The routine does not always need to be related or connected to the math lesson for that day or the math unit for the month. Its purpose is to provide a daily experience with a number sense concept. The ultimate goal is that students make connections over time, build an understanding of relationships among numbers and operations, and ultimately apply their number sense understandings in problem solving."
- Jessica Shumway, pg. 18, Number Sense Routines (2011)



"Number sense routines are a powerful tool in the development of students' mathematical thinking, problem solving and communication skills."
- Early Math Instructional Playbook : Essential Instructional Practice #6: Number Sense Routines (2023)



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THE PARTS OF A NUMBER SENSE ROUTINE Gallery Walk

1 PROMPT

2 THINK TIME

3 SHARING THINKING

4 NOTATION/VERBALIZE STRATEGIES

5 DISCUSSION AND CONNECTION MAKING



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KINDERGARTEN/FIRST GRADE EXAMPLE



IDENTIFYING
THE PARTS OF
A NUMBER
SENSE
ROUTINE



SECOND GRADE EXAMPLE



IDENTIFYING
THE PARTS OF
A NUMBER
SENSE
ROUTINE



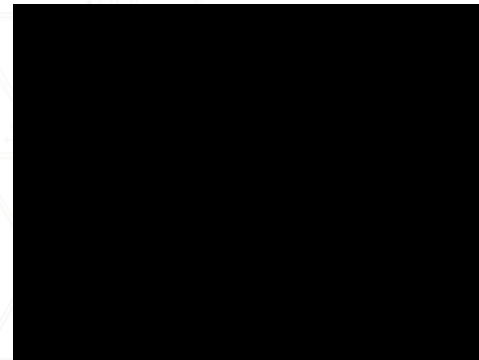
THIRD GRADE EXAMPLE



IDENTIFYING
THE PARTS OF
A NUMBER
SENSE
ROUTINE



FOURTH/FIFTH GRADE EXAMPLE



IDENTIFYING
THE PARTS OF
A NUMBER
SENSE
ROUTINE

SHARE YOUR OBSERVATION/REFLECTION

- The teacher ... when she.....this is important because.....
- The children...when they...this is important because...

GOAL

Think about a component of a high quality number sense routine



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ORGANIZE & INTEGRATE

Building our Number Sense: How can I apply my learning to my classroom?



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APPLICATION CHOICE TIME

- Read more about number sense routines. Reflect on how this new learning can be used in your classroom.
- Review examples of various number sense routines and plan for when/how you will use them in your classroom(s)
- Watch videos of other examples of number sense routines. When/How will you use your new learning with your students?
- Examine your current use of number sense routines. What routines are you using? How are you incorporating the 5 steps? What adjustments might you make?



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Where will you take your learning next?

Take a few minutes to decide what to focus on. Once you have a direction, share your focus area on the poster.

<https://ppsur.me/numbersensepl>



NUMBER SENSE

PROFESSIONAL LEARNING MENU

READ

BOOKS & CHEAT SHEETS

Explore the summary of the various routines listed in the Number Sense book. Which one would you like to read more about? How could this chart be helpful?

Number Sense Cheat Sheets from KREBSA: Learn about Quick Images, Which One Doesn't Belong, Counting Routines, Number Strings and Ways to Make a Number

WEB ARTICLES

6 Unproductive Ways to Learn Math Basics and What to Do Instead from Edutopia

Build Number Sense around word problems with Numberless Word Problems

Check out the learning trajectories for our students as they build their number sense. How might you adjust your routines based on your classes current level of learning?

WATCH

ROUTINES IN ACTION

Explore examples of number sense routines in action with videos from the Michigan EarlyMath site

VIDEOS ON THE COMPONENTS OF NUMBER SENSE

Christina Tondevoid digs into Number Sense Concepts for K-2 and 2-5

DO

EXPLORE NUMBER ROUTINES

HCPSS Mathematics Number Sense Site with numerous routine resources broken down by grade-level

Check out these prompts. How could you use them in your class? What questions might you ask your students? When might you use them? Eightank Math has a wealth of Twinkl building activities.

REFLECT

Reflect on your current use of Number Sense Routines individually or with your team using this reflection sheet

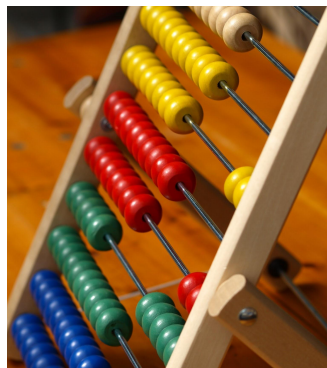
REFINE CURRENT ROUTINES

Do you have a solid set of prompts and routines that you use that you need to either align to your units, scaffold, put in question and sentence stems, etc.? This would be a great time to collaborate with your fellow teachers and work on those.

MATHEMATICS

THANKS!

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The teacher poses a visual, verbal and/or written mathematical PROMPT



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WHAT IS IT?

Teacher prompts are used to give children a mathematical problem to develop number sense, creativity, problem solving and communication.

WHY IS IT IMPORTANT?

- Activating prior knowledge has an effect size of 0.98 (Hattie)
- Tasks given orally drive groups to discuss what is being asked rather than trying to decode instruction on a page ([Liljedahl](#), p. 22)

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HOW ARE PROMPTS USED?

- ❑ The teacher plans with a goal in mind (ie. math strategy, math concept, social interaction).
- ❑ The teacher anticipates student strategies in the planning process.
- ❑ Prior to launching the task, the teacher asks children what tools they can use to help them if they get stuck (fingers and anchor charts - ten frames, domino patterns, number lines, etc.).
- ❑ The teacher invites children to solve the prompt using their own strategies.

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The teacher poses a visual, verbal and/or written mathematical PROMPT

WHAT IS IT?

Students are given adequate, individual think-time to process connections and approaches to the prompt.

WHY IS IT IMPORTANT?

- Gives students time to make connections from what they already know to how it might connect to the prompt.
- Gives students time to individually grapple with new ideas and prior concepts on their own deepens learning and potential connections.

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Think Time:
Students think INDIVIDUALLY

HOW IS THINK TIME USED?

- ❑ The teacher reminds children to use hand-signals to express where they are in their thinking.
- ❑ Student have sufficient think time to process the prompt and formulate ideas.
- ❑ The teacher observes children during individual think time to ensure that children have enough time to productively engage in the prompt.

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Think Time:
Students think INDIVIDUALLY

Sharing Thinking:
Supported by teachers, students SHARE THINKING, including non-fully formed ideas

WHAT IS IT?

After individual processing, the teacher invites children to speak, listen and question.

WHY IS IT IMPORTANT?

- ❑ Teachers who consistently elicit student thinking during a lesson are better able to respond to the needs of students' learning needs by using that evidence to adjust instruction. (Leahy et al. 2005).
- ❑ Provides opportunities for the teacher to gather evidence of student learning as a part of the formative assessment process.

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HOW IS SHARING THINKING USED?

- ❑ The teacher uses structures to support all students in finding & engaging with a partner's mathematical idea, like knee-to-knee, and turn and talk
- ❑ The teacher provides a sentence stem (visually and with a verbal model) to encourage partner talk and to structure their language.
- ❑ The teacher supports children in paraphrasing one another's thinking.
- ❑ The teacher positions themselves so they can listen and gather evidence of student thinking during partner talk.
- ❑ After listening to the students' partner talk, the teacher considers the sequence of strategies to be shared.
- ❑ The teacher monitors talk time to allow the appropriate balance between partner and whole group dialogue.

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Sharing Thinking:
Supported by teachers, students SHARE THINKING, including non-fully formed ideas

The teacher NOTATES and/or VERBALIZES the children's strategies

WHAT IS IT?

The teacher honors children and their strategies by capturing, verbally or visually, the specific approach being offered and making the idea accessible to all students.

WHY IS IT IMPORTANT?

[NCTM Taking Action](#) - "External representations give us greater access to our internal mental representations and allow us to examine, discuss, and explore mathematical ideas with others."

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The teacher **NOTATES** and/or **VERBALIZES** the children's strategies

HOW IS NOTATING/VERBALIZING THINKING USED?

- ❑ Based on the goal and the evidence teachers have gathered, the teacher invites a child to share their strategy with the whole group.
- ❑ The teacher pauses after a child shares.
- ❑ The teacher inquires about a thought-process, mathematical idea or use of a tool so other children have access to it.
- ❑ The teacher notates the child's strategy using a mathematical model that exemplifies important mathematical ideas.
- ❑ The teacher listens and invites class discussion.
- ❑ The teacher asks the child if the summary was accurate.

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The learning community **DISCUSSES** the thoughts that emerged and works to **DRAW CONCLUSIONS**

WHAT IS IT?

With the purpose of consolidation, the teacher invites students to make connections amongst the ideas that were shared and the goal of the routine.

WHY IS IT IMPORTANT?

Classroom Discussion as having an effect size on student achievement of 0.82. (Hattie)

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The learning community **DISCUSSES** the thoughts that emerged and works to **DRAW CONCLUSIONS**

HOW IS DISCUSSION and DRAWING CONCLUSIONS USED?

- ❑ The teacher intentionally plans for child discussion including partnerships and seating.
- ❑ Capture and communicate key mathematical ideas, both verbally and written, that align to the lesson goal.
- ❑ The teacher and students paraphrase key mathematical ideas.
- ❑ Sentence stems are considered to increase the sophistication of the class discussion.
- ❑ The teacher consistently uses wait time
- ❑ The teacher synthesizes the routine by connecting the goal with childrens' strategies.

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