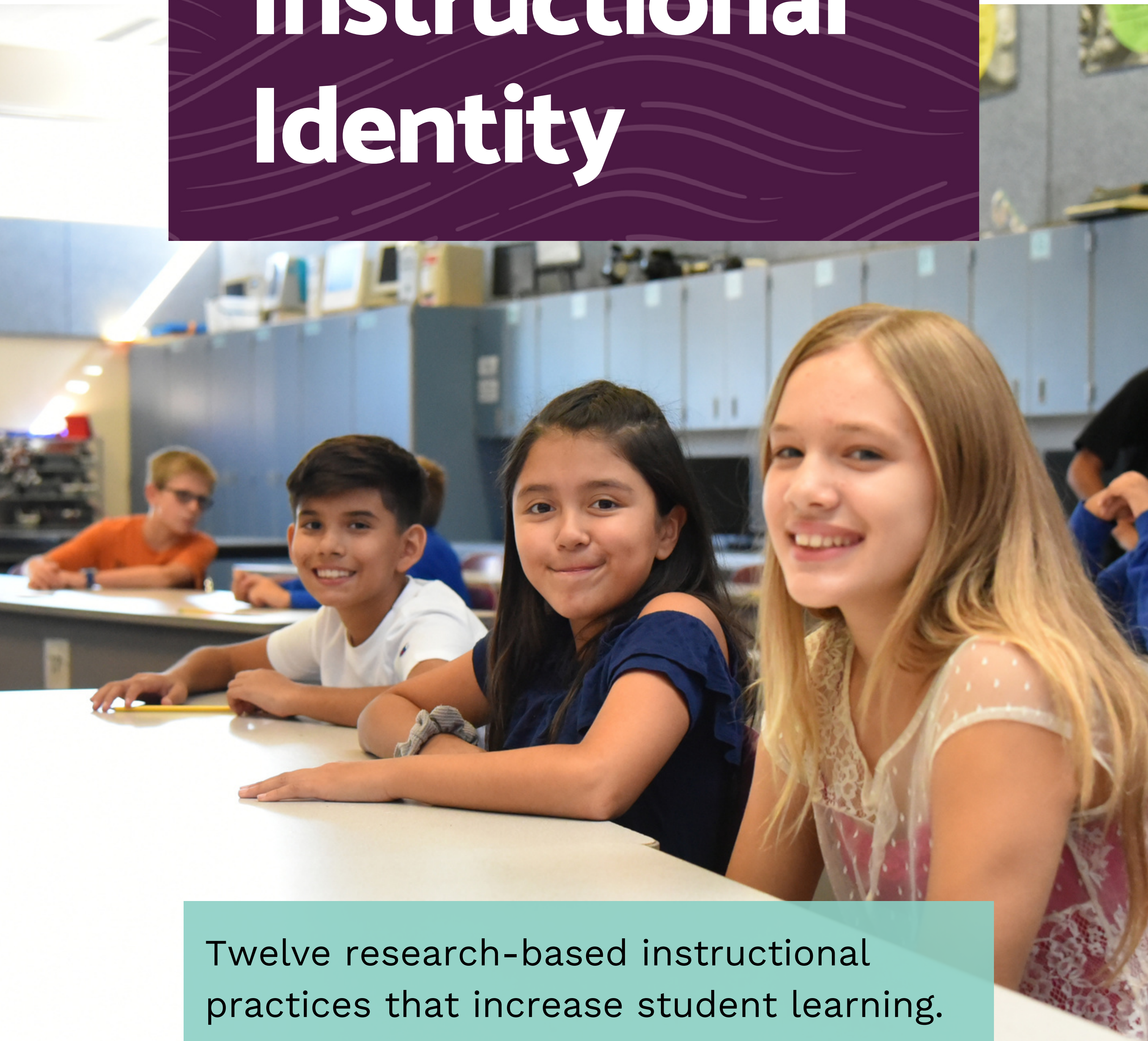
Math Instructional Identity



Twelve research-based instructional practices that increase student learning.

WENATCHEE SCHOOL DISTRICT

Gratitude

The Wenatchee School District is grateful for the collective thought of educators that contributed to the development of our Math Instructional Identity.

2021-2022 WSD Math Research Professional Learning Community

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Sarah Wall - WSD District Office
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Si Stuber - Columbia Elementary
Tamara Honeycutt - Columbia Elementary
Kristi Rupp-Wilson - Foothills Middle School
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Anggie Jagla - Lewis & Clark Elementary
Theresa Brandt - Lewis & Clark Elementary
Kevin Parr - Lincoln Elementary
Leslie Peterson - Lincoln & Sunnyslope Elementary
Tessa Nelson - Lincoln Elementary
Heidi Busk - Mission View & Columbia Elementary
Liliana Mendoza - Mission View Elementary
Janelle Blakney - Orchard Middle School
Tracie Sleeper - Orchard Middle School
Brittney Farmer - Pioneer Middle School
Betsy Strean - Pioneer Middle School
Rob Cline - Pioneer Middle School
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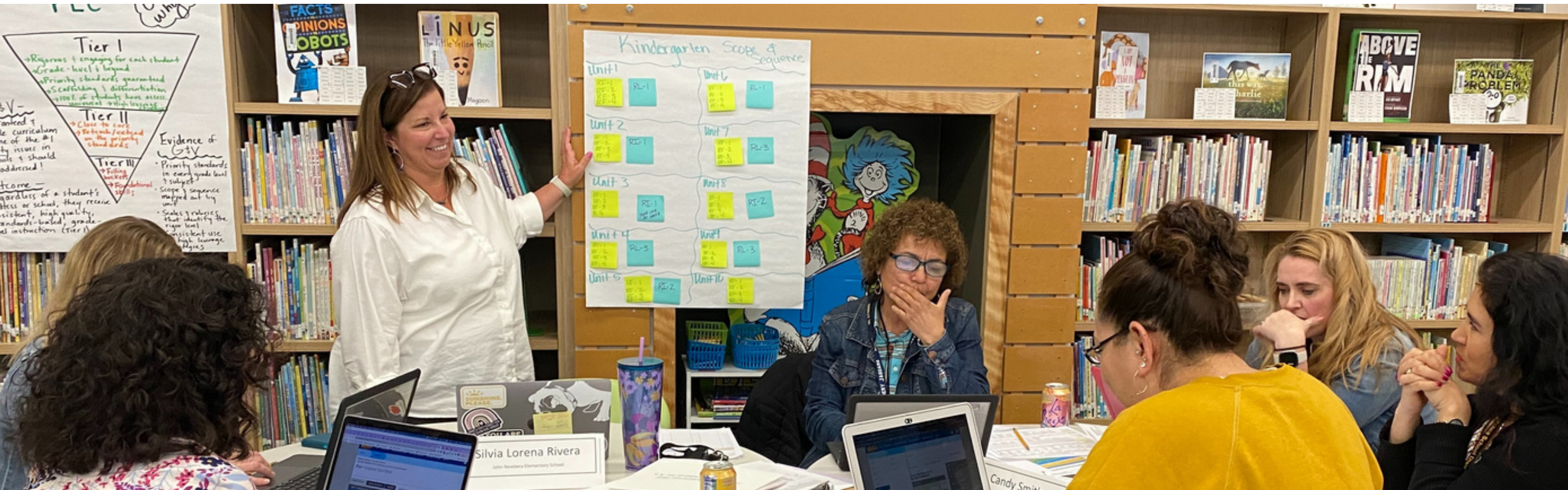


Alignment with our Strategic Plan

Wenatchee School District's new strategic plan will create opportunity and success for every student. To accomplish this, we will help students overcome barriers, fulfill their potential, and graduate—ready to pursue vocational training, college, or a career.

This new strategic plan is a bold commitment to ensure each student receives rigorous instruction, meets grade-level standards, and is on track to graduate. In the next five years, WSD will focus on providing the opportunities and the support for each student to achieve the "Big 6" future-ready outcomes and keep our promise *to build a foundation of diversity, equity, and inclusion from which each student emerges future-ready.*

The strategic plan also incorporates best practices from the most current research about how to positively impact student success. WSD has areas to improve, and the strategic planning process required an honest assessment of our gaps. Feedback coupled with relevant research pointed to the same solution: focus on the students—the quality of their learning and their outcomes.

How Math Instructional Identity supports our plan and promise to students

Priority Area:

Opportunities - Equitable access to high-quality academic, extracurricular, and real-world experiences.

Action Step:

Building the skills and knowledge of our staff in Math and Literacy

BIG 6 Student Outcomes

#1 Experience High-Quality Instruction

#4 Ready for Algebra

What are the WSD Math Instructional Identity Strategies?

The WSD Math Instructional Identity Strategies are twelve research-based instructional practices that increase student learning wherever they are applied. They emerge from the findings of research studies of what works in classrooms. WSD's Math Instructional Identity is grounded in international research from experts such as John Hattie, Robert Marzano, and the National Council of Teachers of Mathematics (NCTM). They are:

1. Engaging instruction
2. Multiple access points (to promote reasoning & problem solving)
3. Procedural fluency
4. Growth Mindset
5. Clear learning intentions & success criteria
6. Productive struggle
7. Student discourse
8. Purposeful questioning
9. Modeling & checking for understanding
10. Guided practice
11. Independent practice
12. Lesson closure

This resource offers:

- Practical explanations, examples, and non-examples of each strategy that can be visibly observed.
- Guidance on using high leverage, evidenced-based strategies
- Insights that enable educators to focus on one or more practices and to progressively build expertise
- Scalable possibilities that allow teachers, professional learning communities (PLCs), whole schools, and leaders to set goals and actions focused on the strategies.

These strategies have been compiled specifically to support the teaching of core math instruction. They do not constitute a complete framework for professional practice.

Who are these strategies for?

Beginning teachers	Can practice and learn to use this bank of reliable instructional practices with confidence.
Experienced teachers	Can add these to practices they are already using, or refine them through practice and reflection, or see new ways to use them in their classrooms.
Professional Learning Communities (PLCs)	Can collaboratively build their pool of knowledge of effective teaching by planning instruction and focusing on these math practices. The practices are linked to each other, and can be connected to collaboration between teachers in PLCs and integrated into the classroom.
Instructional coaches	Can explain, model, observe, and provide feedback on these strategies. Deliberate practice and feedback on these practices in a trusting and collaborative environment will help teachers develop new skills and extend existing ones, impacting both teacher and student learning over time.
School Leaders	Can use these strategies during professional learning opportunities. Using the provided examples, leaders are able to identify the strategies in action by teachers and students, as well as see how students are engaging and benefitting from the practices. A sustained focus on these strategies can be supported by professional learning, leadership, coaching, modeling, observation, and feedback to ensure widespread use of successful teaching practices. They can also inform school planning around curriculum, instruction, and assessment.

Using the strategies

This resource offers teachers and school leaders an opportunity to embed and share the use of successful instructional strategies by providing:

- A common language to use in planning, monitoring, and reflecting on classroom practice.
- A lens through which teachers and leaders can measure their knowledge and progress across twelve high-leverage teaching strategies
- Guidance for improving core mathematics instruction.

Mastery of these strategies requires educators to draw on their deep curriculum knowledge and their skills in assessment for, as, and of learning. Applying the strategies effectively relies on tapping into one's expertise to develop and implement rich, authentic math learning tasks. Adept application of the strategies will stimulate students to take agency for, and reflect on, their own learning.

What is effect size?

Effect size is a research-based measure of how an educational practice affects student achievement. The goal of an effect size is to provide a measure of "the size of the effect" from the educational practice. It illuminates not only whether a practice will work, but also allows educators to consider how well it will work compared to other practices.

This evidence supports a more scientific approach to building professional knowledge. It is an important tool for reporting and interpreting the effectiveness of specific teaching practices and interventions (Education Endowment Foundation, 2012).

One of the most commonly used scenarios for effect size is to determine the effectiveness of an educational practice or intervention relative to a comparison group or approach. Not only does the effect size indicate if an intervention would work, but it also predicts how much impact to expect in a range of scenarios.

World-renowned educational researcher John Hattie uses a process called "meta-analysis" to synthesize research results into a single effect size estimate. Hattie defines d=0.4 to be the hinge point, an effect size at which an instructional practice is likely to have the potential to accelerate student achievement. This hinge point tells us what works best in education. Hattie states that an effect size of d=0.2 may be judged to have a small effect, d=0.4 a medium effect and d=0.6 a large effect on student outcomes. Other researchers, such as Robert Marzano, also use effect sizes.

1 ENGAGING INSTRUCTION

Overview

The goal of engagement is to bring students into a receptive frame of mind to absorb and focus on the learning. Math lessons should include a "hook" to grab the students attention.

The typical aspects of engagement include emotions, interest, perceived importance, and perceptions of efficacy.

Research

"Students take cues from the teacher about how to respond to school activities. If you present a topic or assignment with enthusiasm, your students are likely to adopt the same attitude," (Marzano, The Highly Engaged Classroom).

John Hattie, Visible Learning.

Robert Marzano, The Highly Engaged Classroom

Effect size

John Hattie, Visible Learning
Related effect size: Direct Instruction= 0.59

Robert Marzano, The Highly Engaged Classroom. Related effect size=0.82.

2 MULTIPLE ACCESS POINTS (TO PROMOTE REASONING & PROBLEM SOLVING)

Overview

Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and that allow for multiple entry points and varied solution strategies (NCTM, 2014).

Research

Excellent mathematics instruction includes effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically (NCTM, 2014).

Mathematical tasks can range from a set of routine exercises to a complex and challenging problem that focuses students' attention on particular ideas (NCTM, 2014).

It is important to note that not all tasks that promote reasoning and problem solving have to be set in a context, or need to consume an entire class period or multiple days. What is critical is that a task provides students with the opportunity to engage actively in reasoning, sense making, and problem solving (NCTM, 2014).

Effect size

John Hattie, Visible Learning

3 BUILD PROCEDURAL FLUENCY FROM CONCEPTUAL UNDERSTANDING

Overview

Procedural fluency is built on a foundation of conceptual understanding so that students become skillful in using procedures flexibly over time as they solve contextual and mathematical problems (NCTM).

When students build procedural fluency from conceptual understanding, they retain procedures better and are able to apply them in new learning situations. Developing fluency is strongly related to number sense and extends far beyond having students memorize facts or a series of steps.

Research

Being fluent means that students are able to choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and are able to explain why their strategy choices are appropriate, and they are able to produce accurate answers efficiently. Basic fact fluency includes accuracy, efficiency, appropriate strategy use, and flexibility (Bay-Williams & Kling, 2019).

"Effective mathematics teaching focuses on the development of both conceptual understanding and procedural fluency" (NCTM, 2014).

Effect size

John Hattie, Visible Learning
Related Effect Size: Cognitive task analysis - Effect size: 1.29 and Explicit teaching strategies - Effect size: 0.57

4 GROWTH MINDSET

Overview

To ensure that all students have access to an equitable mathematics program, educators need to identify, acknowledge, and discuss the mindsets and beliefs that they have about students' abilities (NCTM, 2014).

Dweck (2006) has shown that students with a fixed mindset, that is, those who believe that intelligence (especially math ability) is an innate trait are more likely to give up when they encounter difficulties because they believe that learning mathematics should come naturally. By contrast, students with a growth mindset, that is, those who believe that intelligence can be developed through effort, are likely to persevere through a struggle because they see challenging work as an opportunity to learn and grow (NCTM, 2014).

Research

Research has found that a fixed mindset is strongly correlated with socioeconomic background, contributes to widening opportunity gaps, and reinforces inequities (Dweck, 2008; Gamoran, 2010). To address this obstacle, teachers should promote and display a growth mindset at all times. A growth mindset values all students' thinking and uses pedagogical practices such as differentiated tasks, mixed-ability groupings, and public praise for contributions and perseverance to cultivate mathematical participation and achievement (Boaler 2011; NCTM, 2014).

Effect size

John Hattie, Visible Learning
Related effect size:
Student Expectations = 1.44, and
Growth vs. fixed mindsets = 0.15

5 CLEAR LEARNING INTENTIONS & SUCCESS CRITERIA

Overview

Before the lesson is taught, the teacher should develop clear learning intentions based on grade-level standards. The teacher needs to know what learning the students will be held accountable for, when, and how. This information helps the teacher provide relevant learning activities, and helps students understand what is expected (success criteria).

Lessons should have clear learning intentions (targets), written in student-friendly language, that clarify what success looks like. Learning intentions should explain to students what they will understand and be able to do as a result of the learning.

Research

"Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions." (NCTM, 2014).

Effect size

John Hattie, Visible Learning
Related effect size: Learning goals versus no learning goals=0.68; and Direct instruction= 0.59.

6 PRODUCTIVE STRUGGLE

Overview

The effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and support to engage in productive struggle as they grapple with mathematical ideas and relationships (NCTM, 2014).

Research

"Such instruction embraces a view of students' struggles as opportunities for delving more deeply into understanding the mathematical structure of problems and relationships among mathematical ideas, instead of simply seeking correct solutions" (NCTM, 2014).

"Teachers sometimes perceive student frustration or lack of immediate success as indicators that they have somehow failed their students. As a result, they jump in to "rescue" students by breaking down the task and guiding students step by step through the difficulties. Although well intentioned, such "rescuing" undermines the efforts of students, lowers the cognitive demand of the task, and deprives students of opportunities to engage fully in making sense of the mathematics (Reinhart 2000; Stein et al. 2009)

Effect size

John Hattie, Visible Learning
Related effect size: Self-efficacy= 0.65.

7 STUDENT DISCOURSE

Overview

Mathematical discourse should build on and honor students' thinking; provide students with the opportunity to share ideas, clarify understandings, and develop convincing arguments; and advance the mathematical learning of the whole class.

Discussions that focus on cognitively challenging mathematical tasks, namely those that promote thinking, reasoning, and problem solving, are a primary mechanism for promoting conceptual understanding of mathematics (Smith, Hughes, Engle, & Stein, 2009).

Research

Mathematical discourse includes the purposeful exchange of ideas through classroom discussion, as well as through other forms of verbal, visual, and written communication. Discourse in the mathematics classroom gives students opportunities to share ideas and clarify understandings, construct convincing arguments regarding why and how things work, develop a language for expressing mathematical ideas, and learn to see things from other perspectives (NCTM 1991, 2000, 2014).

Effect size

John Hattie, Visible Learning,
Related effect size: Classroom Discussion= 0.82.

8 PURPOSEFUL QUESTIONING

Overview

Purposeful questioning is a powerful instructional strategy that should reveal students' current understandings; encourage students to explain, elaborate, or clarify their thinking; and make mathematics more visible and accessible for student examination and discussion (NCTM, 2014).

Research

A teacher's questions are crucial in helping students make connections and learn important mathematics concepts. Teachers need to know how students typically think about particular concepts, how to determine what a particular student or group of students thinks about those ideas, and how to help students deepen their understanding (Weiss & Pasley, 2004).

Effect size

John Hattie, Visible Learning
Related effect size: Questioning= 0.46.

To ensure that all students have access to an equitable mathematics program, educators need to identify, acknowledge, and discuss the mindsets and beliefs that they have about students' abilities (NCTM, 2014).

9 MODELING & CHECKING FOR UNDERSTANDING

Overview

After productive struggle and discourse, teachers teach skills, strategies, or processes to students. The teacher should model these, and show what is expected as an end product of the learning. This includes the teacher thinking aloud while modeling, and showing students concrete examples of what it looks like when a skill is executed well.

Checking for understanding includes monitoring whether students have acquired the needed procedural knowledge to proceed. The teacher must be sure that students understand the concept before assigning homework as independent practice. If there is any doubt that the class understands, then the concept or skill should be re-taught before students work independently without support.

Research

John Hattie, Visible Learning

Effect size

John Hattie, Visible Learning
Related effect size:
Direct Instruction= 0.59

10 GUIDED PRACTICE

Overview

During the lesson, students should have opportunities to engage in guided practice. The teacher provides well-structured opportunities for students to practice new skills, strategies, or processes during this time. These activities move from very simple to more complex versions of the skill, strategy, or process (Marzano, 2017).

“Guided practice involves an opportunity for each student to demonstrate his or her grasp of new learning by working through an activity or exercise under the teacher’s direct supervision. The teacher moves around the room to determine the level of mastery and to provide feedback as needed” (John Hattie, Visible Learning, p. 205).

Research

Students need to practice skills, strategies, and processes (Marzano, The New Art and Science of Teaching, 2017).

John Hattie, Visible Learning

Effect size

John Hattie, Visible Learning
Related effect size: Direct Instruction= 0.59

11 INDEPENDENT PRACTICE

Overview

Providing independent practice is essential for ensuring that students are able to apply what they have learned.

Research

John Hattie, Visible Learning

Effect size

John Hattie, Visible Learning
Related effect size:
Direct Instruction= 0.59

12 LESSON CLOSURE

Overview

Every lesson should include a thoughtfully planned closure segment during which students are given a chance to make sense of what has just been learned. An appropriate closure cues students to the fact that they have arrived at an important point in their learning, helps the students organize their thinking into a coherent picture, eliminates confusion and frustration. During the closure, the teacher reinforces the major points of a lesson and ties them together into a coherent whole, connecting them to the students conceptual network to consolidate the learning.

Research

John Hattie, Visible Learning

Effect size

John Hattie, Visible Learning
Related effect size: Direct Instruction= 0.59

“If you present a topic or assignment with enthusiasm, your students are likely to adopt the same attitude.” - Robert Marzano

Engaging Instruction

1

Strategy Overview

The goal of engagement is to bring students into a receptive frame of mind to absorb and focus on the learning. Math lessons should include a "hook" to grab the student's attention. The typical aspects of engagement include emotions, interest, perceived importance, and perceptions of efficacy:

- Emotions- Presenting lessons with enthusiasm and sharing statements about the learning activity's value.
- Interest- Catching and holding the students' attention through game-like activities, eliciting divergent opinions, and inviting students to resolve their discrepancies through discussion, using unusual information, and using effective questioning strategies (Marzano, 2011).
- Perceived importance- Making the learning activity important and meaningful to students (e.g. cognitively complex tasks with real-world applications).
- Perceptions of efficacy- Building students' beliefs that they can accomplish the learning tasks and enhancing their sense of self-efficacy (e.g. tracking and studying progress, using effective verbal feedback, providing examples of self-efficacy, and teaching self-efficacy.)

This strategy is demonstrated when the teacher:

- Draws students into learning with a "learning hook".
- Helps students make connections.
- Asks questions at varied levels.
- Incorporates realia, story, and relevant examples to grab students' attention.
- Integrates chants, music, and games to practice math concepts.
- Uses manipulatives to introduce and teach concepts.
- Gives students choice in tools, representations, and problem approaches.
- Models a variety of strategies to solve problems.
- Segments learning into manageable chunks.
- Provides opportunities and time for student discourse.
- Makes connections to the real world by posing relevant problems.
- Includes physical movement during the lesson.

This strategy is not demonstrated when the teacher:

- Incorporates few opportunities for student interaction.
- Provide little or no hands-on opportunities.
- Models only one example, strategy, or tool.
- Limits student choice of strategies to solve problems.
- Provides limited opportunities for practice.

This strategy is demonstrated when students:

- Engage in meaningful tasks and discourse.
- Pull from a variety of models and strategies to solve problems.
- Use think time productively.
- Connect new information to prior knowledge.
- Apply skills while working through math tasks.
- Collaborate to solve problems.

Math Instructional Identity Strategies

Multiple Access Points (to promote reasoning & problem solving)

2

Strategy Overview

Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem-solving and that allow for multiple entry points and varied solution strategies (NCTM, 2014).

This strategy is demonstrated when the teacher:

- Provides opportunities for students to use reasoning strategies and problem-solving methods.
- Presents tasks with multiple entry points to move students thinking forward.
- Provides visuals to support and scaffold students' movement from concrete to abstract thinking.
- Poses cognitively demanding on-grade level tasks.
- Provides scaffolded support as students explore tasks.
- Teaches academic math vocabulary.

This strategy is not demonstrated when the teacher:

- Presents tasks that limit entry points.
- Limits the use of varied tools, representations, and strategy choice.
- Teaches the use of keywords, rote procedures, or math tricks.
- Dictates the strategy to be used.
- Takes over student thinking.

This strategy is demonstrated when students:

- Use various tools and strategies to understand problems.
- Persevere in reasoning through tasks.
- Draw on prior understanding to make sense of problems.
- Value classmates' use of various strategies.
- Are able to show and explain their thinking.

Math Instructional Identity Strategies

Build Procedural Fluency from Conceptual Understanding

Strategy Overview

Procedural fluency is built on a foundation of conceptual understanding so that students become skillful in using procedures flexibly over time as they solve contextual and mathematical problems (NCTM).

When students build procedural fluency from conceptual understanding, they retain procedures better and are able to apply them in new learning situations. Developing fluency is strongly related to number sense and extends far beyond having students memorize facts or a series of steps.

This strategy is demonstrated when the teacher:

- Creates strong conceptual foundations prior to teaching procedures.
- Provides opportunities for students to practice strategies and procedures to solidify their knowledge after they have built a strong conceptual foundation.
- Asks students to defend why their procedures work.
- Bridges students' strategies to more efficient procedures.
- Displays visuals to support the learning of mathematical procedures
- Reteaches concepts to deepen understanding.

This strategy is not demonstrated when the teacher:

- Teaches procedures without providing conceptual context.
- Models only one strategy.
- Focuses too early or heavily on memorization.
- Progresses through instruction without monitoring student thinking.

This strategy is demonstrated when students:

- Employ flexibility when selecting and applying strategies and/or methods.
- Determine whether specific approaches generalize to a broad set of problems.
- Determine the most effective or efficient strategy.
- Use manipulatives to make sense of procedures.
- Practice procedures to solve problems.
- Produce accurate answers efficiently.

Growth Mindset

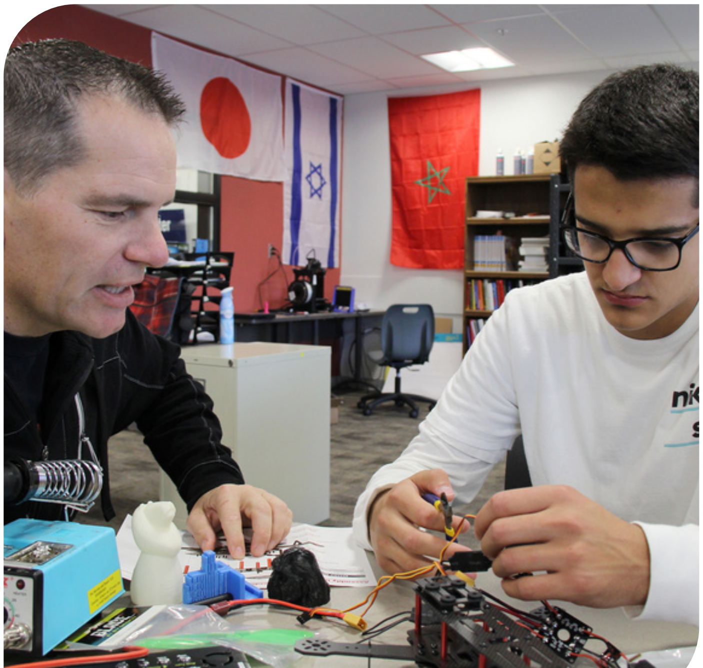
Strategy Overview

To ensure that all students have access to an equitable mathematics program, educators need to identify, acknowledge, and discuss the mindsets and beliefs that they have about students' abilities (NCTM, 2014).

Dweck (2006) has shown that students with a fixed mindset, that is, those who believe that intelligence (especially math ability) is an innate trait are more likely to give up when they encounter difficulties because they believe that learning mathematics should come naturally. By contrast, students with a growth mindset, that is, those who believe that intelligence can be developed through effort, are likely to persevere through a struggle because they see challenging work as an opportunity to learn and grow (NCTM, 2014).

This strategy is demonstrated when the teacher:

- Provides examples and activities that support a growth mindset.
- Uses growth mindset language with students.
- Celebrates student efforts, attitude, mistakes, and risk-taking.
- Models learning from mistakes.
- Encourages productive struggle.
- Provides opportunities for students to set goals and reflect on learning growth.



This strategy is not demonstrated when the teacher:

- Focuses on performance or products rather than the process.
- Affirms correct answers rather than flexible thinking.
- Provides little acknowledgement of effort.
- Provides non-specific praise.
- Describes students as smart.
- Reinforces students' self-criticism when they make errors.
- Communicates a fixed mindset about one's own expertise.

This strategy is demonstrated when students:

- Track their progress and set goals toward learning targets and success criteria.
- Reflect upon growth in their learning.
- Learn from mistakes and demonstrate perseverance.
- Affirm each other's thinking and work.

Math Instructional Identity Strategies

Clear Learning Intentions & Success Criteria

5

Strategy Overview

Before the lesson is taught, the teacher should develop clear learning intentions based on grade-level standards. The teacher needs to know what learning the students will be held accountable for, when, and how. This information helps the teacher provide relevant learning activities, and helps students understand what is expected (success criteria).

Lessons should have clear learning intentions (targets), written in student-friendly language, that clarify what success looks like. Learning intentions should explain to students what they will understand and be able to do as a result of the learning.

This strategy is demonstrated when the teacher:

- States what students will be learning and the purpose in student-friendly language.
- Links learning activities to the learning goals.
- Explains how the learning goals relate to rigorous mathematics standards.
- Refers to the learning target during the lesson.
- States what students will be held accountable for.
- Shares examples (rubrics, etc.) and non-examples of success criteria.
- Explaining the learning target.
- Showing examples of what is expected & non-examples.
- Providing feedback based on the success criteria (or rubric).
- Asking “Why is this relevant in the real world?”
- Informing students about standards of performance...”You will be successful when...”
- Aligned to standards
- Planning the learning target & success criteria in advance.

This strategy is not demonstrated when the teacher:

- Doesn’t explain what the student will be able to do or understand as a result of the learning.
- Gives unclear expectations or has a moving target.
- Learning activities are not aligned with the stated learning intention.
- Doesn’t state the learning target.
- The learning target is unclear.
- Doesn’t provide success criteria.

This strategy is demonstrated when students:

- Explain the learning goal.
- Describe the success criteria.
- Self-monitor their progress, and provide evidence that they have achieved their goals.
- Self-evaluate.
- Able to state the learning goal.
- Showing how their work meets the learning goal.
- Self-monitoring progress.
- Self-evaluating.
- Participating in a quick check formative or Common Formative Assessment aligned to the learning intention.

Math Instructional Identity Strategies

Productive Struggle

Strategy Overview

The effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and support to engage in productive struggle as they grapple with mathematical ideas and relationships (NCTM, 2014).

This strategy is demonstrated when the teacher:

- Observes student behavior in order to notice when students' struggle is productive or unproductive.
- Supports students appropriately as they grapple with problems.
- Asks purposeful questions for each learning level to scaffold students' understanding.
- Gives students adequate time to work through tasks on their own without rescuing them.
- Supports students in realizing that confusion and errors are a natural part of learning.
- Facilitates discussions about mistakes, misconceptions, and struggles.
- Praises students for working through the process, rather than the correct answer.
- Praises students for their efforts to make sense of mathematical ideas.
- Encourages perseverance in reasoning through problems.

This strategy is not demonstrated when the teacher:

- Rescues students by introducing a strategy in the midst of their struggle.
- Lowers the task level when students are struggling.
- Limits questioning about student thinking.
- Spends too much time in one place in the classroom.
- Provides inappropriate pacing for a math task.

This strategy is demonstrated when students:

- Persevere in solving problems.
- Recognize that it is acceptable to say things like, "I don't know how to proceed."
- Ask questions related to the sources of their struggles.
- Celebrate breakthroughs in thinking after experiencing confusion and struggle.
- Guide each other through math tasks.
- Support each other's efforts through praise.

Math Instructional Identity Strategies

Student Discourse

7

Strategy Overview

Mathematical discourse should build on and honor students' thinking; provide students with the opportunity to share ideas, clarify understandings, and develop convincing arguments; and advance the mathematical learning of the whole class.

Discussions that focus on cognitively challenging mathematical tasks, namely those that promote thinking, reasoning, and problem solving, are a primary mechanism for promoting conceptual understanding of mathematics (Smith, Hughes, Engle, & Stein, 2009).

This strategy is demonstrated when the teacher:

- Engages students in purposeful sharing of mathematical ideas, reasoning, and approaches, using varied representations.
- Selects and sequences student approaches and solution strategies for whole-class analysis and discussion.
- Facilitates student discourse where students explain and defend their approaches and affirm others.
- Makes explicit connections between students' approaches and reasoning.
- Provides purposeful time, structures, and routines for student discourse to occur.
- Teaches academic vocabulary explicitly.
- Encourages students to use academic vocabulary.

This strategy is not demonstrated when the teacher:

- Does the majority of the talking.
- Provides answers before discussion
- Expects silence in the classroom.
- Limits time for students to explain their reasoning.
- Limits wait time when asking questions.
- Limits some students' opportunity to engage in academic discourse.

This strategy is demonstrated when students:

- Discuss and justify their strategies and reasoning.
- Affirm each other.
- Ask clarifying questions of peers.
- Describe problem-solving approaches used by classmates.
- Describe similarities and differences in approaches.
- Use academic vocabulary to explain their thinking.

Math Instructional Identity Strategies

Purposeful Questioning

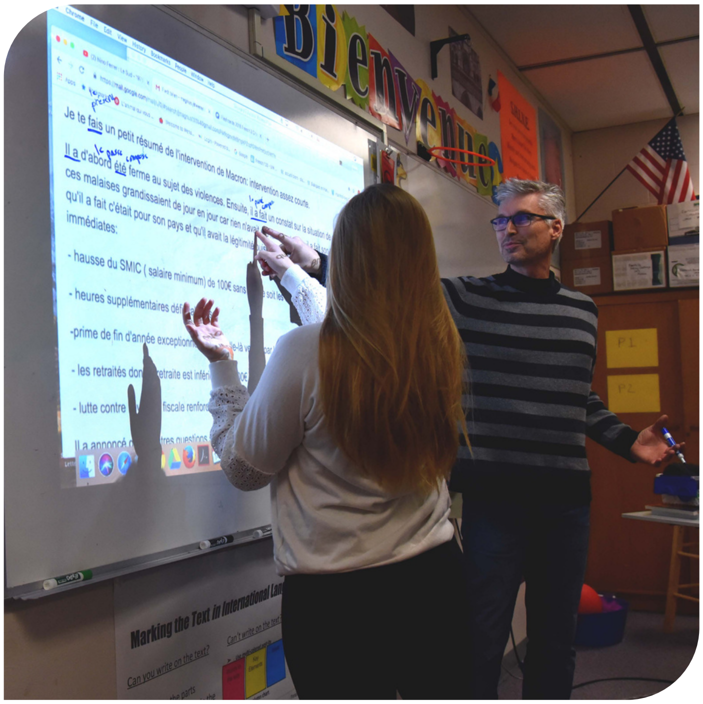
8

Strategy Overview

Purposeful questioning is a powerful instructional strategy that should reveal students' current understandings; encourage students to explain, elaborate, or clarify their thinking; and make mathematics more visible and accessible for student examination and discussion (NCTM, 2014).

This strategy is demonstrated when the teacher:

- Facilitates learning through questioning to build on, but not take over, student thinking.
- Asks varied levels of questions to probe thinking.
- Encourages students to defend thinking
- Asks intentional questions to make math visible and accessible for students.
- Allows sufficient wait time.



This strategy is not demonstrated when the teacher:

- Asks closed or leading questions.
- Provides answers before asking questions to reveal student thinking.
- Asks only lower level questions
- Provides insufficient wait time.

This strategy is demonstrated when students:

- Answer questions.
- Explain, clarify, and elaborate on their thinking.
- Ask questions about the thinking of others
- Justify their answers with evidence.
- Take time to think through their answers to questions.

Math Instructional Identity Strategies

Modeling & Checking for Understanding

9

Strategy Overview

After productive struggle and discourse, teachers teach skills, strategies, or processes to students. The teacher should model these, and show what is expected as an end product of the learning. This includes the teacher thinking aloud while modeling, and showing students concrete examples of what it looks like when a skill is executed well.

Checking for understanding includes monitoring whether students have acquired the needed procedural knowledge to proceed. The teacher must be sure that students understand the concept before assigning homework as independent practice. If there is any doubt that the class understands, then the concept or skill should be re-taught before students work independently without support.

This strategy is demonstrated when the teacher:

- Presents a scaffold or model to support student understanding of concepts.
- Models examples of how to solve the problems.
- Circulates through the classroom to monitor student learning.
- Holds each student accountable for learning.
- Makes and displays anchor charts with examples.
- Uses meaningful exit tickets.
- Re-teaches if needed.
- Models mistakes.
- Addresses students' misconceptions.

This strategy is not demonstrated when the teacher:

- Provides limited or no modeling of strategies.
- Moves on without getting feedback from students.
- Gives students the answers.
- Uses closed questions.

This strategy is demonstrated when students:

- Show and explain their thinking.
- Demonstrate their understanding at the end of a learning segment.
- Answer the teacher's questions.
- Compare their solutions to their classmates.

Guided Practice

10

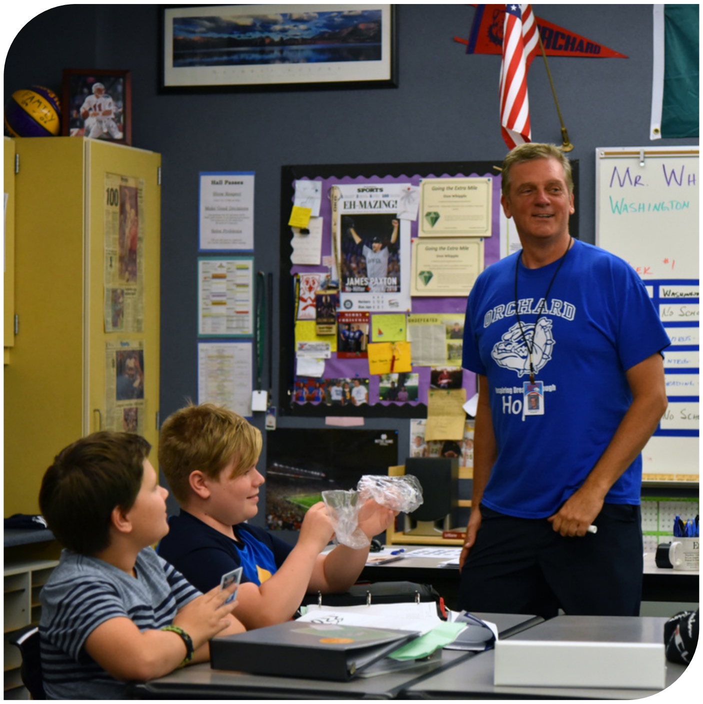
Strategy Overview

During the lesson, students should have opportunities to engage in guided practice. The teacher provides well-structured opportunities for students to practice new skills, strategies, or processes during this time. These activities move from very simple to more complex versions of the skill, strategy, or process (Marzano, 2017).

“Guided practice involves an opportunity for each student to demonstrate his or her grasp of new learning by working through an activity or exercise under the teacher’s direct supervision. The teacher moves round the room to determine the level of mastery and to provide feedback as needed” (John Hattie, Visible Learning, p. 205).

This strategy is demonstrated when the teacher:

- Models strategies previously used.
- Moves about the room, observing where teacher interaction and feedback would be beneficial.
- Encourages students to demonstrate understanding in a variety of ways.
- Selects a continuum of activities to move students toward skillful independence.



This strategy is not demonstrated when the teacher:

- Guides students through each problem step-by-step.
- Talks the majority of the time.
- Provides little to no feedback or practice/corrections.
- Stays in one place in the classroom.

This strategy is demonstrated when students:

- Engage in math practice activities individually, in partners, or groups.
- Use a variety of tools to help with a task and show their thinking.
- Request and respond to feedback.
- Seek input and help from others.

Math Instructional Identity Strategies

Independent Practice

11

Strategy Overview

Providing independent practice is essential for ensuring that students are able to apply what they have learned.

This strategy is demonstrated when the teacher:

- Circulates through the classroom to monitor student learning.
- Asks questions to support student understanding.
- Praises thinking and effort.
- Assigns problems at different levels.
- Differentiates the task based on student progress.
- Assesses student learning of the skill or concept to check for mastery.

This strategy is not demonstrated when the teacher:

- Talks throughout independent practice.
- Provides step-by-step instructions.
- Limits access to math tools or models.
- Praises speed.
- Notices correct answers only.
- Assigns an unreasonable number of practice/homework problems.
- Provides no feedback to students following independent practice.

This strategy is demonstrated when students:

- Attempt to complete tasks independently.
- Utilize tools, resources, and strategies to solve problems.
- Persevere when tasks are difficult.
- Provide evidence of completing the task.

Math Instructional Identity Strategies

Lesson Closure

12

Strategy Overview

Every lesson should include a thoughtfully planned closure segment during which students are given a chance to make sense of what has just been learned. An appropriate closure cues students to the fact that they have arrived at an important point in their learning help the students organize their thinking into a coherent picture, and eliminates confusion and frustration. During the closure, the teacher reinforces the major points of a lesson and ties them together into a coherent whole, connecting them to the students' conceptual network to consolidate the learning.

This strategy is demonstrated when the teacher:

- Revisits the learning target.
- Summarizes the major points from the lesson to consolidate learning.
- Connects the lesson with prior and future learning.
- Provides the opportunity for students to share their acquired learning.
- Provides the opportunity for students to reflect on their learning in relation to the learning target.

This strategy is not demonstrated when the teacher:

- Ends the lesson without a thoughtful closure.
- Misses the opportunity to connect the learning with previous or future learning.
- Closes the lesson without allowing students to make sense of what was learned.
- Closes the lesson without summarizing or providing a reflection opportunity.

This strategy is demonstrated when students:

- Share what they learned.
- Reflect on their learning in relation to the learning target.
- Explain how their learning connects to their prior knowledge.

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My Notes

WENATCHEE
SCHOOL DISTRICT

Learning & Teaching Department
2022 - 2023

OUR PROMISE: We promise to build a foundation of diversity, equity and inclusion from which each student emerges future-ready