Practice Profile for High-Quality Mathematics Instruction

Name of Practice/Program: High-Quality Mathematics Instruction **Date**: May 2023

Philosophy, Values, & Guiding Principles:

Access to high-quality math instruction is a fundamental value provided to Florida's students through the Benchmarks for Excellent Student Thinking (B.E.S.T) Standards. With the successful implementation of the B.E.S.T. Standards for Mathematics, our students are capable of unprecedented success. It is the responsibility of all educators to establish the necessary infrastructure to help students thrive. This infrastructure will be student-centered, inclusive of all learners, and incorporate Universal Design for Learning (UDL) principles.

High-quality math instruction builds upon student prior knowledge, develops a foundation for future learning, and is guided by careful planning of appropriate instructional goals, content, methods, routines, and use of materials. High-quality math instruction includes teachers consistently using the appropriate mathematical language within the B.E.S.T. Standards and guiding students to develop their own use of academic vocabulary.

Five characteristics of high-quality math instruction:

- Attends to the horizontal and vertical alignment of the benchmarks.
  - Horizontal alignment is the intentional connection of content within a grade or course level linking skills within and across strands.
  - Vertical alignment is the intentional progression of content from one year to the next, spanning grades K-12, to gain a broader perspective of student learning.
- Balances the use of instructional approaches intentionally as the context demands.
  - Examples of instructional approaches include, but are not limited to the following: explicit instruction, inquiry-based instruction, and differentiated instruction.
- Student-centered.
  - Student-centered means that instruction is based on specific student needs and their learning engagement.

- All components of instruction defined in the Practice Profile are student-centered.

- Uses assessment to inform instruction.
  - Informed by four types of classroom assessment: screening, progress monitoring, formative assessment, diagnostic, and summative assessment.
  - Using assessment data to identify the appropriate instructional approach, select appropriate scaffolds, guide differentiation of instruction, and use corrective feedback.
- Implements tiered instruction.
  - Tiered instruction is a model in which instruction and interventions are delivered for all students based on student data.
  - Tiering (Tiers 1-3 relates specifically to instruction and interventions, not groups of students.

High-quality math instruction results in deeper student understanding of mathematical concepts, strategies, and skills, increased student engagement with mathematics, and improved student learning outcomes.

Inclusion/Exclusion Criteria: Includes instruction provided to all K-12 students.

Desired Outcomes:

- Closing the achievement gap in mathematics.
- Increasing student performance on NAEP for $4^{th,}$ $8^{th,}$ and 12^{th} Grades.
- Increasing K-8 student performance on FAST.
- Increasing student performance on Algebra I and Geometry EOC.

Component	Contribution to the Desired Outcome	Accomplished Use	Developing Use	Ineffective Use
Description of the Component	An explanation of how the components contribute to the desired outcome	Activities and behaviors that exemplify adult practitioners who are able to generalize required skills and abilities to a wide range of settings and contexts; skills are used consistently and independently – skills are sustained over time while continuing to grow.	Activities and behaviors that exemplify adult practitioners who are able to implement required skills and abilities but in a more limited range of contexts and settings – skills are used inconsistently or need coaching to complete or successfully apply particular skills for improvement in order to move to Expected Use in Practice level. This column helps to define the focus of coaching.	Activities and behaviors that exemplify adult practitioners who are not yet able to implement the required skills or abilities in context.
SYSTEMATIC INSTRUCTION is a highly structured, organized sequence of teaching that introduces and reinforces new concepts, strategies, and skills over time and aims to ensure a cumulative progression of learning from simple to complex.	Systematic instruction contributes to the student's continuous acquisition of increasingly complex concepts, strategies, and skills to become a confident mathematician. Systematic instruction decreases the possibility of a student developing a math deficiency over time and builds a foundation for future learning.	1. Uses a logical progression of concepts, strategies, and skills, moving from simple to more complex. 2. Utilizes existing connections across grade or course levels, linking concepts, strategies, and skills to previously learned and future benchmarks. 3. Utilizes existing connections within grade or course-level benchmarks to support student learning. 4. Uses formative assessment aligned with the benchmarks to provide immediate feedback.	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Misplaces concepts, strategies, and skills in the learning progression. 2. Teaches concepts, strategies, and skills without covering the whole range from simple to complex, not meeting the needs of all students. 3. Teaches without attending to the intentional progression of content from one year to the next, spanning across multiple grade levels. 4. Teaches benchmarks in isolation. 5. Does not use formative assessment. 6. Uses formative assessment that is not aligned with the benchmarks.

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SCAFFOLDED INSTRUCTION is the intentional and strategic support provided by a teacher for students to carry out a task, solve a problem, or achieve a goal that requires support. Support is planned, temporary, and adjustable based on student understanding and need, and the support fades as mastery of concepts, strategies, and skills increases.	Scaffolded instruction contributes to student learning by building upon student knowledge and experience. It bridges learning gaps and helps students deepen their understanding of concepts, strategies, and skills at grade or course level. Scaffolded instruction also supports English language learners in communicating information, ideas, and concepts necessary for academic success. The goal is to enable students to accomplish a learning task independently.	1. Provides intentional and temporary support matched to student learning needs. 2. Provides access to a problem by breaking it down into smaller steps to achieve mastery of the task aligned with grade or course-level benchmarks. 3. Models by using manipulatives, prompts, cues, visual aids, and examples. 4. Monitors the student's response to scaffolding and adjusts support needed until the student can perform the task independently.	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Overlooks students having difficulty carrying out a task or solving a problem on their own. 2. Offers students access to the problem at grade or course level without breaking it down into smaller steps if needed. 3. Does not use written or verbal prompts, cues, tools, or resources to provide appropriate support relating to the needs of the student. 4. Does not monitor student response to scaffolding or does not adjust requisite support to empower the student to perform the task independently.

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DIFFERENTIATED INSTRUCTION is adapting instruction in response to the distinctly assessed skills and needs of students to increase their access and opportunity to meet grade or course-level learning goals or progress toward them.	Differentiated instruction contributes to student learning by adapting instructional strategies to meet student needs in accessing and mastering grade or course-level standards and benchmarks. Differentiated instruction allows students to remediate, stay on task, or accelerate their learning as needed.	1. Uses resources aligned to specific student needs to address barriers to learning. 2. Tailors instruction in response to specific learning needs of each student or group of students by adjusting one or more of the following: the content (what is taught and resources that are used), the process (how learning is structured), the product (what is produced and assessed), or the physical learning environment. 3. Monitors student understanding and progress toward meeting specific learning goals to determine further instructional responses.	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Uses resources without taking into account individual student learning needs. 2. Utilizes the same content, process, product, or learning environment without considering individual learning needs. *3.* Does not collect or use student data to determine further instructional responses.

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CORRECTIVE FEEDBACK is identifying and correcting student errors by explaining what each error is and suggesting how it can be corrected, making sure students understand why an answer is either correct or incorrect. Corrective feedback needs to be timely, specific, individualized, and ongoing.	Corrective feedback contributes to student learning by providing opportunities to reflect and correct misconceptions or errors and reinforces expectations during lessons. Corrective feedback creates a collaborative process between teachers and students that supports continuous learning and improvement.	1. Provides encouragement to students to persevere through challenging math tasks. 2. Identifies errors and provides strategies for future learning and improvement. 3. Provides students with specific and timely feedback addressing their performance on the assigned learning task. 4. Provides opportunities for students to give constructive feedback to one another. 5. Identifies misconceptions behind patterns of errors or mistakes and takes steps to rectify student understanding of concepts, strategies, and skills of a learning task.	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Gives a challenging math task without any support or encouragement. 2. Does not check for errors or focuses too heavily on pointing out errors and providing negative feedback. 3. Provides vague or general feedback or does not provide feedback in a timely manner. 4. Does not give opportunities for students to give constructive feedback to one another. 5. Does not identify misconceptions or does not take steps to help clarify the misconceptions to bolster student understanding of concepts, strategies, and skills.

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EXPLICIT INSTRUCTION is highly structured, intentional teaching, with clear objectives and purposeful presentation to students, of the concepts, strategies, and skills necessary to master learning objectives. Explicit instruction models thinking and problem-solving skills and can be implemented as needed in whole groups, small groups, or individually.	Explicit instruction contributes to student learning by minimizing proximal gaps and misconceptions through teacher modeling and opportunities to practice when other instructional approaches have not yet supported mastery of grade or course-level learning objectives.	1. Uses student-friendly language to clearly explain specific grade or course-level learning objectives. 2. Breaks down information strategically into meaningful parts. 3. Communicates the concept, strategy, or skill being taught using appropriate mathematical language. 4. Models thinking and problem-solving skills by demonstrating the mental strategies involved. 5. Provides sufficient opportunities to practice using the concept, strategy, or skill being taught. 6. Collects and analyzes student data to drive instructional decisions and provide feedback.	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Identifies grade or course-level learning objectives without explaining them clearly and concisely. 2. Presents information continuously without strategically breaking it down into meaningful parts. 3. Communicates the concept, strategy, or skill confusingly or incompletely or without using mathematical language. 4. Provides a sequence of steps to solve a problem but does not explain the thinking or reasoning behind it. 5. Uses a predetermined amount of practice without considering student

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				progress towards the concept, strategy, or skill being taught. 6. Fails to plan and implement formative assessment to check for understanding and drive instructional decisions.

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INQUIRY-BASED INSTRUCTION is a discovery-based approach where teachers act as facilitators while students develop understanding of concepts, strategies, and skills through exploration.	Inquiry-Based Instruction contributes to student learning by emphasizing critical thinking, creativity, curiosity, collaboration, and problem-solving, allowing students to take ownership of their learning and develop a deeper understanding of concepts, strategies, skills, and real-world connections. Inquiry-based instruction provides students the opportunity to justify	1. Creates challenging learning experiences by presenting a topic in an engaging way, where students use critical thinking and problem-solving skills. 2. Implements collaborative structures to encourage students to discuss a problem and draw on their mathematical knowledge to understand it. 3. Guides students to explore different ways to solve a real-world problem through modeling and the use of manipulatives. 4. Facilitates the exploration and group discussion by	*Intentionally Left Blank* *Intentionally Left Blank* *Intentionally Left Blank*	1. Provides learning experiences that only require students to recall information but not engage in critical thinking and problem-solving skills. 2. Creates a classroom environment that prioritizes quiet and individual work. 3. Instructs or limits students to solve problems using only one strategy or procedure. 4. Limits exploration and group discussions by only asking questions that require recall or are not aligned to grade or course-level benchmarks. 5. Selects student work that only addresses correct answers, missing the opportunity for error analysis.

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	their methods using appropriate mathematical language and compare their mathematical thinking to the thinking of their peers to advance and deepen understanding of correct and increasingly efficient methods.	asking purposeful and probing questions aligned with the benchmarks. 5. Selects and sequences sample work, allowing students to present their different approaches and solutions to collaboratively analyze correct and incorrect answers.		

Glossary

Differentiation:

Formative assessment:

Infrastructure:

Scaffolding:

Teacher modeling: Teacher modeling is when a teacher uses explicit instruction to model or demonstrate how to perform a task or procedure for the benefit of students.

Universal Design for Learning:

Citations of Research Used

Scaffolded Instruction

Anghileri, J. (2006). Scaffolding practices that enhance mathematics learning. *Journal of Mathematics Teacher Education*, *9*(1), 33-52. https://doi.org/10.1007/s10857-006-9005-9

Bakker, A., Smit, J., & Wegerif, R. (2015). Scaffolding and dialogic teaching in mathematics education: Introduction and review. *ZDM Mathematics Education*, *47*(7), 1047-1065. https://doi.org/10.1007/s11858-015-0738-8

Moschkovich, J. N. (2015). Scaffolding student participation in mathematical practices. *ZDM Mathematics Education*, *47*(7), 1067-1078. https://doi.org/10.1007/s11858-015-0730-3

Rittle-Johnson, B., & Koedinger, K. R. (2005). Designing knowledge scaffolds to support mathematical problem solving. *Cognition and Instruction*, *23*(3), 313-349. https://doi.org/10.1207/s1532690xci2303_1

Differentiated Instruction

Hackenberg, A. J., Creager, M., & Eker, A. (2021). Teaching practices for differentiating mathematics instruction for middle school students. *Mathematical Thinking and Learning*, *23*(2), 95-124. https://doi.org/10.1080/10986065.2020.1731656

Deunk, M. I., Annemieke E. Smale-Jacobse, A. E., de Boer, H., Doolaard, S., & Bosker, R. J. (2018). Effective differentiation practices: A systematic review and meta-analysis of studies on the cognitive effects of differentiation practices in primary education. *Educational Research Review*, *24*, 31-54. https://doi.org/10.1016/j.edurev.2018.02.002

Pierce, R. L., & Adams, C. M. (2004). Tiered lessons: One way to differentiate mathematics instruction. *Gifted Child Today*, *27*(2), 58–65. https://doi.org/10.4219/gct-2004-133

Russo, J., Bobis, J., & Sullivan, P. (2021). Differentiating instruction in mathematics. *Mathematics Teacher Education and Development*, *23*(3), 1-5. https://mted.merga.net.au/index.php/mted/article/view/715/436

van Geel, M., Keuning, T., Frèrejean, J., Dolmans, D., van Merriënboer, J., & Visscher, A. J. (2019). Capturing the complexity of differentiated instruction. *School Effectiveness and School Improvement*, *30*(1), 51-67. https://doi.org/10.1080/09243453.2018.1539013

Corrective Feedback

Cabang, F. I. F., & Roble, D. B. (2022). Strengths of formative feedbacks with line by line hints & repeated parallel question on promoting students' mathematics achievement. *American Journal of Educational Research*, *10*(2), 73-80. https://doi.org/10.12691/education-10-2-1

Fyfe, E. R., Borriello, G. A., & Merrick, M. (2022): A developmental perspective on feedback: How corrective feedback influences children's literacy, mathematics, and problem solving. *Educational Psychologist.* https://doi.org/10.1080/00461520.2022.2108426

Fyfe, E. R., & Brown, S. A. (2020). This is easy, you can do it! Feedback during mathematics problem solving is more beneficial when students expect to succeed. *Instructional Science*, *48*(1), 23-44. https://doi.org/10.1007/s11251-019-09501-5

Metcalfe, J. (2017). Learning from errors. *Annual Review of Psychology*, *68*(1), 465-489. https://doi.org/10.1146/annurev-psych-010416-044022

Explicit Instruction

Chen, O., & Kalyuga, S. (2020). Exploring factors influencing the effectiveness of explicit instruction first and problem-solving first approaches. *European Journal of Psychology of Education*, *35*, 607-624. https://doi.org/10.1007/s10212-019-00445-5

Doabler, C. T., Baker, S. K., Kosty, D. B., Smolkowski, K., Clarke, B., Miller, S. J., & Fien, H. (2015). Examining the association between explicit mathematics instruction and student mathematics achievement. *The Elementary School Journal*, *115*(3), 303-333. https://www.journals.uchicago.edu/doi/abs/10.1086/679969

Kroesbergen, E. H., Van Luit, J. E. H., & Maas, C. J. M. (2004). Effectiveness of explicit and constructivist mathematics instruction for low-achieving students in the Netherlands. *The Elementary School Journal, 104*(3), 234-251. https://doi.org/10.1086/499751

Morgan, P. L., Farkas, G., & Maczuga, S. (2015). Which instructional practices most help first-grade students with and without mathematics difficulties? *Educational Evaluation and Policy Analysis*, *37*(3), 184-205. https://doi.org/10.3102/0162373714536608

Systematic Instruction

Hardy, J. K., & Hemmeter, M. L. (2019). Systematic instruction of early math skills for preschoolers at risk for math delays. *Topics in Early Childhood Special Education*, *38*(4), 234-247. https://doi.org/10.1177/0271121418792300

Ross, D., & Frey, N. (2009). Learners need purposeful and systematic instruction. *Journal of Adolescent & Adult Literacy*, *53*(1), 75–78. https://doi.org/10.1598/JAAL.53.1.8

Smith, L. M., Sáez, L., & Doabler, C. T. (2016). Using explicit and systematic instruction to support working memory. *TEACHING Exceptional Children*, *48*(6), 275-281. https://doi.org/10.1177/0040059916650633

Inquiry-based Instruction

Khalaf, B. K., & Zin, Z. B M. (2018). Traditional and inquiry-based learning pedagogy: A systematic critical review. *International Journal of Instruction*, *11*(4), 545-564. https://doi.org/10.12973/iji.2018.11434a

Lazonder, A. W., & Harmsen, R. (2016). Meta-analysis of inquiry-based learning: Effects of guidance. *Review of Educational Research*, *86*(3), 681-718. https://doi.org/10.3102/0034654315627366

Marshall, J.C., & Horton, R.M. (2011). The relationship of teacher-facilitated, inquiry-based instruction to student higher-order thinking. *School Science and Mathematics*, *111*, 93-101. https://doi.org/10.1111/j.1949-8594.2010.00066.x

Öztürk, B., Kaya, M., & Demir, M. (2022). Does inquiry-based learning model improve learning outcomes? A second-order meta-analysis. *Journal of Pedagogical Research*, *6*(4), 201-216. https://doi.org/10.33902/JPR.202217481