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| **Title**: Message 17 – Constructive Struggling | **Date**: 10/24/13 |
| **Presenter(s): Amanda Graybill** | **Audience: Coaches and Deans** |
| **Learning Goals:**Participants will understand the meaning of “constructive struggling” and determine the teacher and student behaviors that build and exemplify perseverance (SMP #1).  | **[x]  District Focus: Math Core Standards and Standards for Mathematical Practice****[ ]  School Focus:** **Marzano Strategies**[ ] DQ1: Communicating Learning Goals and Feedback[ ] DQ2: Helping Students Interact with New Knowledge[ ] DQ3: Helping Students Practice and Deepen New Knowledge[x] DQ4: Helping Students Generate and Test Hypotheses[ ] DQ5: Engaging Students[ ] DQ6: Establishing Rules and Procedures[ ] DQ7: Recognizing Adherence to Rules and Procedures[ ] DQ8: Establishing and Maintaining Effective Relationships[ ] DQ9: Communicating High Expectations for All Students[x] Domain 2: Planning and Preparing [ ] Domain 3: Reflecting on Teaching [ ] Domain 4: Collegiality and Professionalism |
| **Act 48 Goals:**  3A. Content Knowledge in Core Areas3C. Focus on Problem Solving3D. Focus on Math Skills and Concepts | **Theory of Action Goal(s):**[ ]  Graduation [ ]  Secondary Literacy[ ]  Elementary Literacy[ ]  Building Leadership Capacity | **Alignment to Theory of Action:**[ ]  Curriculum Design [ ]  Professional Development [x]  Effective Teaching[ ]  Feedback |
| **Content Focus/Vocabulary:***Standards for Mathematical Practice – Perseverance (SMP #1)**Constructive Struggling**Complex Mathematical Tasks* | **Texts:** *Faster Isn’t Smarter* by Cathy SeeleyMaterials and Resources: Constructive Struggling Powerpoint Presentation“Adding Odds” Tasks“Tiling a Patio” Tasks“Big Bang Theory Clips”1. Sheldon’s Board - <https://www.youtube.com/watch?v=7grhQEP9zio>
2. Einstein #1 – Constructive Struggling <https://www.youtube.com/watch?v=8vkyFgFQw90>
3. Einstein #2 – Ball Pit <https://www.youtube.com/watch?v=0MrDe_2eW10>

Task Analysis Guide |
| **Instructional Plan and Flow** |
| **BEFORE** | **Jump Start Thinking/Pre-Assessment**1. Video Clip – Sheldon’s Board. As you watch the clip, think about how this clip does or does not match what happens in typical math classrooms when students are working through a complex task.
2. Share today’s learning goal: *Participants will understand the meaning of “constructive struggling” and determine the teacher and student behaviors that build and exemplify perseverance (SMP #1).* In the clip, Sheldon was working through a particularly challenging physics task involving a lot of complex math, and it was interrupted by Leslie, who saw his mistake and swooped in to fix it for him instead of letting him struggle through it himself. Today we’ll talk about the importance of allowing students to persevere through complex tasks with the right amount of support so that deep learning can occur.
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| **DURING** | 1. Share a short summary of the focus of message 17 (constructive struggling).
	* Research has shown (the TIMSS study) that students in the United States are held to very different expectations than students in other countries when it comes to the level of complexity of the tasks we ask them to complete.
	* The author has found through many years of research and study that teachers in the United States want to help students to understand the math, which has led to “spoon-feeding” strategies, answers and methods for solving complex problems to students instead of gradually releasing responsibility as students become more independent thinkers and problem solvers.
	* Teachers think they are “helping” students when in fact they are hindering students’ abilities to persevere through more challenging tasks.
	* The author of this text challenges us to acknowledge that sometimes math is hard, and that it is okay to struggle through complex tasks. “It turns out that offering students a chance to struggle may go hand in hand with motivating them, if we do it right.” p. 90
	* A teacher’s job is to plan for engaging and challenging tasks. It is understood that these tasks may require a larger time investment, but the author argues that this initial investment will ultimately provide more conceptual learning and understanding than several shorter, more simplistic problems or tasks.
	* Effective teachers understand that guiding students with careful questioning and scaffolding of complex tasks, without telling students exactly what they need to know or how to solve the problem, helps to build perseverance in solving those complex tasks.
2. POWERPOINT
	* Overview of Peg Smith’s work (U of Pittsburgh) on the need for tasks with a high level of cognitive demand so that students can develop the mathematical habit of mind to persevere, and “constructively struggle”. the ***tasks*** or activities in which students engage should provide opportunities for them to “figure things out for themselves” (NCTM, 2009, p.11), and to justify and communicate the outcome of their investigation.
	* Connection between complexity of tasks and student perseverance – Students who are given the opportunity to struggle through complex tasks with appropriate teacher facilitation and scaffolding (not giving answers) will lead students to develop the mathematical habits of mind they will need to succeed with math.
	* Slides 4, 5, 6, and 7 - Determine what constitutes a complex task and how teachers scaffold the problems so that students can access the tasks and begin to gradually increase the complexity once students have found success with initial entry points. *Compare the two versions of the tasks and explain what makes them different. Also consider how the versions promote the use of the math practice standards.*
	* Share observations about “Conjectures” tasks. Share observations about “Tiling a Patio” tasks.
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| **AFTER** | **Plan for monitoring/Post-Assessment** 1. TABLE DISCUSSION
	1. Distribute quotes/questions about complex math tasks, “constructive” struggling, and perseverance
		* “Not all tasks are created equal, and different tasks will provoke different levels and kinds of student thinking.” (Stein, Smith, Henningsen, & Silver, 2000)
		* “The level and kind of thinking in which students engage determines what they will learn.” (Hiebert, Carpenter, Fennema, Fuson, Wearne, Murray, Oliver, & Human, 1997)
		* “If we want students to develop the capacity to think, reason, and problem solve then we need to start with high-level, cognitively complex tasks.” (Stein & Lane, 1996)
		* “There is no decision that teachers make that has a greater impact on students’ opportunities to learn and on their perceptions about what mathematics is than the selection or creation of the tasks with which the teacher engages students in studying mathematics.” (Lappan & Briars, 1995)
		* What teaching actions do you think support or inhibit students’ willingness to accept the struggle that goes with a challenging problem?
		* How can you help your students develop the confidence and persistence necessary to persevere through a complex task?
	2. Ask participants to jot notes about their thinking and whether or not they agree and why or why not on their quote/question to prepare for discussion with their tables
	3. Each person will have two minutes to share their quote/question and their thoughts. Tablemates will share thinking around each statement or question.
2. Share one big idea from each table before closing.
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| **Reflection/Assessment/Monitoring Results** |
| Close the session with a short video clip (Big Bang Clips: Einstein #1 and Ball Pit #2) to remind participants of the importance of complex tasks and student perseverance. When Sheldon is able to work through problems on his own, he was able to learn more and develop ways of representing his thinking that he originally did not consider. It is this type of deep mathematical thinking that we need to develop in our students by providing them with high-quality, complex tasks with the appropriate types and amount of scaffolding to let them “constructively struggle” so that more learning can occur. |

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What teaching actions do you think support or inhibit students’ willingness to accept the struggle that goes with a challenging problem?

How can you help your students develop the confidence and persistence necessary to persevere through a complex task?