Tiered Lesson – Leslie Neely, Kaylen Baker – 3/14/09

Planning Template: Tiered Differentiated Lesson
(Taken from: *Tools for High Quality Differentiated Instruction, ASCD Tool*)

Planning a Tiered Differentiated Lesson

Subject: Math – Number Patterns Grade: 2nd grade

Objectives

Essential question of the lesson:

- How can we use patterns to help us solve other math problems, such as addition and subtraction word problems?
- What patterns can we find around our classroom and in our world?

Students will know (essential information to be learned):

- That to continue a number pattern means to use the "rule" of the pattern to add on to it, not to repeat it.

Students will understand (big ideas, principles, and generalizations):

- that being able to find patterns in groups of numbers can help them to see how numbers relate to each other and can help them to find fast and easy ways to solve addition and subtraction problems.
  * this understand objective is trying to get at number sense and computational fluency, which are part of NCTM's Number and Operations standard, in a student-friendly way.

Students will be able to (essential skills, observable and measurable outcomes):

- Identify the "rule" or pattern that a group of numbers follows
- Continue a number pattern using the rule that was identified
- Identify number patterns around the classroom and state the "rule" they follow
- Create their own number pattern, using a set "rule" that others could use to continue their pattern

WHO?

Who are the students in the class? What specific traits or needs do they have that require differentiation? In what ways do they vary most (reading level, interest in subject, need for structure, etc.)? How do I know? How will I find out? If I pre-assess the students, what will my pre-assessment look like? Describe your preassessment here.

Who are the students? These second grade students are at various places in their comfort and flexibility in thinking about numbers. Several students are very flexible in their thinking. They use grouping and patterns to solve problems and do this spontaneously, without prompting from anyone. They are adept at skip counting by 2s, 5s, and 10s both backwards and forwards, and they often use this skill when solving problems. Several students are very tentative when it comes to numbers. They tend like more concrete ways to solve problems. These students are just beginning to be fluid at counting by 2s, 5s, and 10s. They can get thrown off if they are asked to skip count starting at a random number, like counting by 2s but starting at 5. Still other students are in between these two groups. They can solve problems and think flexibly about numbers, but often need some scaffolding to get there.

How would we pre-assess for number pattern knowledge? A great way to pre-assess for this lesson would be to have students solve and respond to number patterns in their math journals the day before this lesson will be taught. Students will already expect a "problem of the day" to be up on the board for them to solve and write about in their journals. Several number patterns of differing complexity, including both repeating and growing patterns, will be up on the board when students come in to class. Students will be prompted (both via the board and orally via the teacher) to continue the number patterns, write the "rule" they used, and write about how they continued the patterns (how did you find the rule? Was it tricky to find? How did you use it to continue the pattern?). The teacher will then be able to read through these responses and refine groupings for the lesson that will follow the next day.

OVERALL PLAN FOR LESSON (include ideas for whole-class instruction, if any; differentiated activities; sharing; etc.)

Introduction:

Let students know that you will be talking about number patterns today and remind them that they saw a few patterns on the board yesterday as their "problem of the day." Ask students to talk more about number patterns briefly – can anyone define a pattern? How do you solve them? What do you have to do to continue a pattern?

Then ask students to see if they can find any number patterns around the classroom of think of anywhere else they have seen number patterns (the classroom is set up to include several such patterns already – in the calendar, in a

strip showing the number of school days, etc.). Ask students to state the pattern and the "rule" it follows.

After hearing a few patterns, talk to students about why getting practice at solving number patterns is important. Discuss with students that mathematicians don't just work to solve problems that other people give them, like problems you might see on a worksheet. They work with numbers, looking for patterns and interesting things about groups of numbers. Working with number patterns gives students practice thinking about numbers and how they relate to each other. The better students get at thinking about numbers, looking for patterns in groups of numbers, and counting up and down, the easier it will be to solve math problems in the future, like addition and subtraction problems.

Tell students that they are going to all be working with different number patterns today. There will be three groups of students working on the same kinds of patterns, and everyone will come together at the end of class to share how they solved their patterns and some patterns they created themselves. Help the students divide up into the Red group, the Green group, and the Blue group by showing them where they will be working in the classroom and where their particular worksheets are located (color coded bin in the front of the room). The Green and Blue groups will be working more independently, while the Red group will be working at a curved table where the teacher can provide more scaffolding and support at the beginning of the task. Each group will be working to extend several number patterns, state the "rule" they used to do this, and create their own patterns, switching with partner if there is time.

Lessons:
Tier 1: Red Group. These students are slightly more tentative in their pattern work than other students. They will be working with patterns that follow rules in line with counting strategies they have seen before, such as counting by 2s, 5s, and 10s. An example of a pattern in this tier might be: 2, 4, 6, 8, 10, ___, ___ etc. The teacher will check in quickly with all groups, then come back to the Red group and provide support in getting started with the pattern work. The teacher will encourage students to use manipulatives such as unifix cubes to visually and physically represent the number patterns. The teacher will model how the manipulatives can help them find the "rule" and continue the pattern. The teacher will also conduct "think-alouds" to show how she is thinking when she looks for a rule and uses it to extend a pattern. When students are ready, the teacher will help them brainstorm strategies for creating their own number patterns and switching with peers to solve these patterns.

Tier 2: Green Group. These students are more flexible in their thinking and solving of problems, but still benefit from scaffolding to encourage this

flexibility. They will be working with patterns that follow rules like "growing patterns." An example of such pattern would be: 1, 2, 4, 7, 11, 17, ____, ____, etc., with the rule being "+1, +2, +3, +4, +5, +6" and so on. Students will have access to manipulatives, but won't be prompted to use them specifically. The teacher will be checking in with students in this group, but not providing as much support and scaffolding as the Red Group will receive. Students will also be more on their own in terms of creating their own patterns. The teacher will check in with this group once the Red Group has gotten started, and will be available to model think-alouds for this group if they seem to need this.

Tier 3: Blue Group. These students are quite flexible when thinking about numbers. They spontaneously use patterns and groupings when solving problems. They will be working with patterns that follow rules that include both growing and decreasing of numbers. An example of such a pattern would be: 2, 5, 4, 7, 6, 9, 8, ___, ____, etc., with the rule being "+3, -1, +3, -1." The teacher will be checking in with the students early on to be sure they understand what is expected of them, but will provide less scaffolding. The patterns students are using are more open-ended and should spark students to create patterns of their own that are similar to these.

Closing Activities: The class will come back together and share strategies that helped them to notice and solve their patterns. They will then share patterns that they created and the "rule" that accompanies these patterns. They will explain how they discovered the answer and how they know the answer is correct. For example, a student might say, "I knew that the rule was +3 because each number in the pattern was three numbers larger than the number before it." Finally, students will discuss how this work with number patterns has stretched their thinking about numbers. The teacher will show them a more traditional math problem where they could use their pattern knowledge to quickly find the answer. (For example, the teacher could show students a word problem where counting by 2s could help them quickly find the answer). The teacher will use this example to spark a discussion of how using patterns can be helpful in solving other math problems, highlighting the fact that students don't have to only use their pattern knowledge when they are asked to solve a pattern by someone else, like they did earlier today. Every time they see a math problem, students can think about whether or not patterns might help them to solve this problem.

1. Think about the most advanced student you have ever had. Design an activity (clearly related to your KUD goals) that would stretch this student. Who are the students that you are thinking of? What are their characteristics?

The students we are thinking of are those that are already thinking about numbers in advanced ways, more advanced than we might spontaneously. These are the kids who came in on the first day of second grade and answered questions at calendar time by grouping numbers, counting by 10s, and etc. spontaneously. They are those students who don't seem to be tied down by traditional ideas for solving problems and seem to be able to think very fluidly about numbers and patterns. These students will be working in the Blue Group or Tier 3 (see above paragraph for explanation of activity).

Use the *equalizer* to help you think about this activity. Describe which facets of the equalizer you adjusted, how you adjusted them and why you think this will help students access the advanced level task.

For this task, we adjusted the facets of **simple-complex**, **structured-open**, and **more/less independence**. The students in the Blue Group are working with patterns that use more complex rules, thus adjusting the simple-complex facet of the equalizer. They will be working more independently of the teacher, who will be structuring the task more with the Red Group, thus adjusting the independence facet. They will be hearing less brainstorming ideas and think-alouds from the teacher, thus leaving the task more open. Adjusting these three facets of the equalizer will help these students because it will allow them to think more creatively about their number patterns. They will be free to try out complex rules and to create their own patterns with complex rules. While students in the Red group will feel mastery by brainstorming ideas with the teacher and then using these ideas to create their own patterns, the students in the Blue Group seem to like to think creatively and flexibly about numbers on their own. They will benefit from this more open-ended, less structured task.

2. Now, figure out ways to scaffold the task so that students at or near grade level can be successful with it. Make sure this version still matches your KUD goals.

Students who are at or near grade level can also be successful with this more advanced task with some scaffolding and assistance from the teacher. Once the teacher has prepared the Red Group for their task, she will monitor the Green Group (our at or near grade level kids) as they work on the more concrete patterns (rule +2, +5, etc) and when she believes that it is appropriate, she can introduce a new, more challenging pattern (for example, +3, -1). The teacher will ask students how they might figure out the rule and complete the pattern. She will listen to their ideas and use them in a think-aloud explanation of the activity She may also use manipulatives and drawing strategies to show the students exactly what they should be doing; focusing on these strategies if she feels it is

necessary. She will then monitor students as they work through a set of problems as a group, asking both probing and explaining ("How did you know? What did you do? How do these numbers compare to each other? OK, good. What number comes next? Why?" etc) questions to the group and to individuals as they work.

Use the *equalizer* to help you think about this activity. Describe which facets of the equalizer you adjusted, how you adjusted them and why you think this will help students access the advanced level task.

For this task, we adjusted the facets of **small/great leap**, **more/less structured** and **more/less independence**. The students in the Green Group will begin working with patterns that use more complex rules, similar to the patterns that the Blue Group has been working on. For this, the teacher will adjust the small/great leap facet of the equalizer. While students in the Blue Group will generally be able to independently take what they know about simple patterns and apply and transfer that knowledge to more complex patterns, the Green Group will need to break this down into smaller pieces and make "smaller leaps" as they progress. It may take more time for this group to make connections and apply their knowledge and they may need some assistance when making these leaps. We have also made this task more structured than the task given to the Blue Group. The teacher will lead them through a think-aloud, but they will also be asked to join in the process as the teacher asks questions about what she is doing and why she is making the decisions about the pattern and the rule. Because they will be working more as a team, with the teacher, the activity will consequently be more structured and defined. This brings us to the more/less independent facet. This group will be working *with* the teacher a bit more than the Green Group because they will require more assistance and more scaffolding, thus making the activity less independent. Because students in the Green Group are at or near grade level, they may not be as ready as their above grade level peers to independently tackle this more advanced task. They will benefit from working together with the teacher and brainstorming ideas so that they can experience success with the activity before they attempt it on their own.

3. Now, figure out ways to further scaffold the task so that students who would struggle with the above task could be successful. Double-check that you have not watered down the task to the point that the students miss out on the KUD goals.

The Red Group, or the group of students who would struggle with the above task, could experience success with the activity as long as the teacher works hard to provide explicit instruction with scaffolding, and provides students with

ample strategies that will help them as they become more independent with the activity. These are the students who would initially need a direct instruction lesson on this more complex number pattern (+3, -1) task and the teacher would provide that as a first step. She would work through a problem herself; thinking aloud as they proceeds through the steps while using manipulatives to *show* her thinking. This will be helpful for these students as it makes the task more concrete and because they have been working with manipulatives and are familiar with how to use them. The teacher will continue, stopping periodically to ask the students if they understand and to ask simple questions ("What did I just do? Do you know why I did that?" etc). Once they have completed this task, the teacher and the group will work together to solve a problem, or more, depending on how well the students grasp the concept, using manipulatives. Finally, the teacher will allow the students to work in their groups to solve a problem without her direct assistance, while she observes their use of strategies and evaluates their understanding. With appropriate scaffolding and direct, explicit instruction, these students can be absolutely successful with this task.

Use the *equalizer* to help you think about this activity. Describe which facets of the equalizer you adjusted, how you adjusted them and why you think this will help students access the advanced level task.

For this task, we adjusted the facets of **concrete-abstract**, **more/less independence**, and **slow-quick** pace. The students in the Red Group, while eventually working with the same types of problems as students in the Blue Group, will require a more explicit and direct style of instruction. It will be very helpful for them to use manipulatives so that they are able to *see* the pattern and manipulate the numbers in a very physical way. This adjusts the equalizer in the concrete-abstract facet so that the task is more concrete; it uses more physical materials and initially leaves less up to abstract interpretation. They will be require the most attention from the teacher out of the three groups, thus adjusting the independence facet and making the activity *less* independent in terms of planning, designing, and monitoring. In terms of the slow-fast facet, these students require more time and more in-depth explanation in order to initially experience success. Therefore, the teacher will make sure that the explanation of the task, as well as her brainstorming and think-aloud session, will be a slower pace than it would be with the Green Group, for example. Students in this group will spend more time observing the teacher as she works through a problem and brainstorming *with* the teacher as they work through a pattern together. Adjusting these three facets of the equalizer will help these students because it will allow them to experience success and mastery of a difficult task without the frustration that would occur if they were turned loose to learn and complete the task on their own.

NOW WHAT?

How will you know if today's lesson "worked"? What will you watch for? How will you use what happens in this lesson to improve the next day's instruction?

It will be evident that the lesson "worked" if the students are able to solve the problems and explain how they got their answers. Although the teacher will be primarily assisting the Red Group, she will also be monitoring and occasionally assisting the progress of each of the groups work. She will be listening to group conversations and will pose questions to the group and to individuals based on the discussions that are taking place. For examples, she might ask students "Well, why do you say that? How did you get +4? Can you show me how you would figure out the next number? The next?" and so on. The teacher will monitor for students attending to the lesson; on-task behavior, productive and on-topic discussion, and not only correct answers on the page, but the ability to explain *why*. It is also important for the teacher to assess her own scaffolding strategies and evaluate the lesson based on these. Did each group benefit from the individual instruction? Why or why not? What worked? What did not work? When planning to improve the next day's instruction, the teacher should ask herself each of these questions. If *everything* worked, then she may want to use many of the same strategies and styles of instruction that she did in this lesson. However, if the teacher finds that some aspects of the lesson did not work, it is important to find out *why* they didn't work and *what* she can do to improve them. This reflection and assessment should be based on each individual group, rather than on the class as a whole. She can use her successes and her mistakes to plan a better, more effective lesson for the next day's class.

THINKING ABOUT THE LESSON

WHAT?	
What did I differentiate? Content or representation of content? Process? Activity? Product?	For this lesson, we differentiated both content and representation of content. In terms of content, we initially had two groups working on simple number patterns and one, more divergent-thinking group, working on more complex number patterns. However, when we taught these skills to each of the groups, we planned differently based on the

	ability levels of each group (Red- below grade level, Green- at or near grade level, and Blue- above grade level). We knew that the lower level group(s) may need more concrete examples and more teacher-lead instruction before they could master the task on their own. Meanwhile, the high level group could be almost totally independent and would not require as much direct assistance. Even when we planned to teach the same lesson (more complex patterns) to each of the three differentiated groups, our lessons for each group were very different. We understand that each of these groups need different methods and strategies and they need to acquire skills in different ways, so we planned accordingly both in terms of content and representation of content. Our processes were also varied to some extent. This was also based primarily on level of independence. Some students can succeed with more of it, while some need more assistance and "team work" before they can succeed on their own. Our lesson plans reflect our understanding of this. Red and Blue Groups need varying levels of assistance, while Blue group is basically (while not *totally)* independent. Activities and product were virtually the same; we just planned to help the children get there in the way that best suits their readiness and ability.